INTERNATIONAL

Air Races

THE SLIPSTREAM
MONTHLY
PUBLISHED IN DAYTON OHIO
"THE BIRTHPLACE OF THE AIRPLANE,
THE CENTER OF AVIATION"

Souvenir of
DAYTON
OHIO, U.S.A
Oct. 2, 3, 4

Vol. 5 No. 10

Price 25 cents

Tests Conducted at State University

At Columbus, Ohio, Prove That

Caldwell & Taylor's Original

BENZOL GAS

The King of Motor Fuel

Runs Cooler in Your Motor Than Gasoline
Gives Greater Mileage Than Gasoline
Gives Quicker Pickup Than Gasoline
Produces More Power Than Gasoline
Less Crankcase Dilutions Than Gasoline
Produces No Detonations (Motor Knocks)

ALL quality products sell at a premium, but most quality products prove to be the most economical.

Caldwell & Taylor's Original Benzol Gas will give you 25% more mileage, 25% more power. Eliminates all cost of cleaning for carbon or grinding of valves. Try for a period of one month and you will find the expense of fuel and upkeep of your machines, as compared with gasoline, will diminish. GIVE IT A TRIAL.

You can find it most any place in Ohio and Northern Kentucky by making inquiry. For your protection, buy only where you see our little red sign.

CALDWELL & TAYLOR

Wholesale Distributors

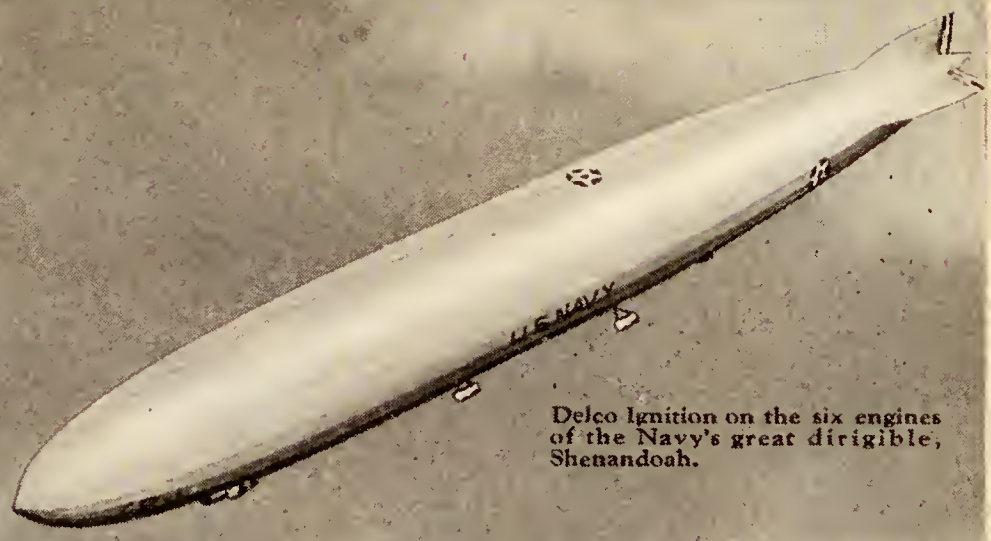
Cincinnati :-: Dayton :-: Columbus

See Reading Article Page 76

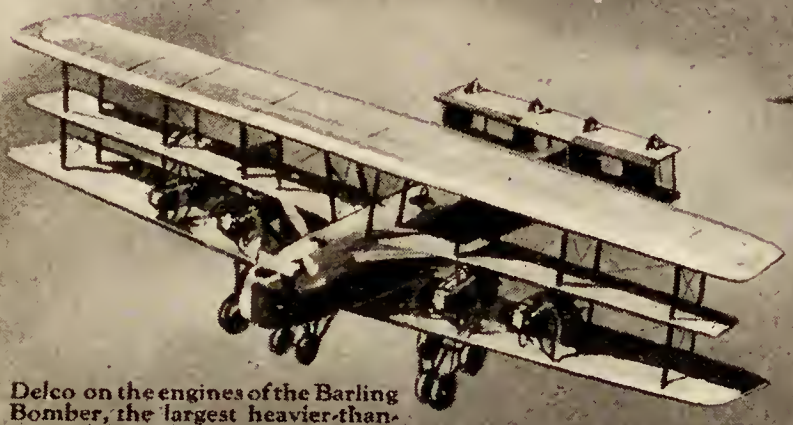
"The Aviator"

Being modeled by Augustus Lukeman and to be erected by Mrs. Louis Bennett of West Virginia, in honor of the American aviators who made the supreme sacrifice in the World War.

Delco furnished the ignition for the Army Round the World flight.

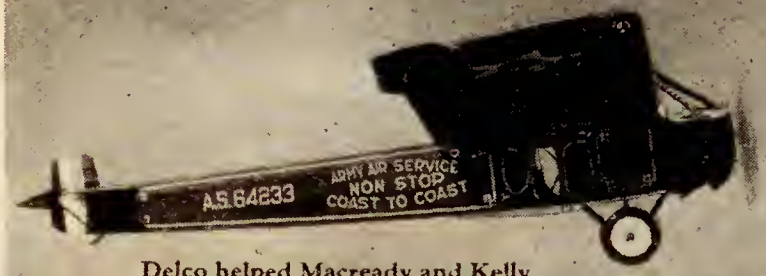


Delco Ignition on the six engines of the Navy's great dirigible, Shenandoah.



Delco on the engines of the Barling Bomber, the largest heavier-than-air craft ever flown.

Delco on the Navy's NC4's which accomplished the first Trans-Atlantic flight.



Delco helped Macready and Kelly establish a non-stop flight across the continent.

Delco Ignition on the engine which powered the Mexico to Canada non-stop flight, Lieutenant H. G. Croker, May 22, 1923.

Delco used on Stout's Air Pullman, the first American designed and built, all-metal commercial airplane.

SUPREME in the air as on the land, Delco ignition is preferred by pilots and designers who have accomplished the outstanding triumphs of American wings. The aircraft illustrated here represent some of the achievements in which Delco has been proud to share

The Dayton Engineering Laboratories Co.
Dayton, Ohio

Delco
IGNITION

FOREWORD

IN presenting this issue of The Slipstream Monthly to the public the publisher feels that the magazine has attained a distinguished mark in the annals of aeronautical journalism.

The Slipstream Monthly has always upheld the interests of Dayton in everything pertaining to aviation, although in thus giving predominance to so much "local" matter the business interests of the company have been sorely limited.

During the five years that The Slipstream Monthly has been published it has gained a world wide reputation and a prestige which few, if any, periodicals of the kind can equal.

In looking back over former issues the editor feels that The Slipstream Monthly can justly lay claim to the honor of being one of the principal factors in turning the eyes of the world on Dayton's aeronautical activities, and which has now culminated in this final triumph—the staging of the International Air Races.

The success with which the management has met in compiling this special Air Race number is due largely to the progressive spirit prevailing in the industrial life of the Miami Valley. The manner in which the various industries cooperated in making this issue possible stands as an example of their public spirit, their interest in the community, and the profound faith they hold for the ultimate expansion of the aeronautical industry.

Therefore we feel that these firms—represented in our advertising pages are entitled to a prominent position in this issue. Contrary to the views of some we maintain that well prepared advertising matter adds both to the appearance and character of the publication.

If Dayton is to retain her position as the Center of Aviation—if the Airplane born in Dayton is to take its rightful place in the affairs of human progress it is to such organizations that we must look to for the things to make it possible.

Signed

THE EDITOR.

STAFF

Fred F. Marshall, Editor.
Henry C. Langefeld, Advertising Mgr.
G. W. Von Scio, Advertising.
Carl Sandstrom, Advertising.

Another Epoch Making Discovery of Dayton's Great Laboratories

In the General Motors laboratories at Dayton, skilled minds and vast resources are devoted to the everlasting improvement of motor transportation.

And now, following a series of momentous contributions during the last several years, comes another announcement of one more new and major achievement—Ethyl Gas—a product that leading authorities in both the petroleum and automotive industries agree is the world's most efficient automotive fuel.

Ethyl Gas increases fuel efficiency—steps up the power of an engine—prevents all harmful effect of carbon—improves combustion—keeps spark-plugs clean—quickens acceleration—lets you shoot the hills with the spark advanced without a knocking motor.

Ethyl Gas is today's motor fuel —and tomorrow's!

GENERAL MOTORS RESEARCH LABORATORIES

THE National Aeronautic Association is a nation-wide organization formed to foster, encourage, and advance the science of aeronautics. It affords to every public-spirited citizen an opportunity to cooperate for the national welfare through the development of aerial navigation.

Recognized everywhere as a dignified body of patriotic men and women devoted to a movement for the nation's prosperity in peace and security in war, the Association is the only organization in this country which represents aeronautics as a whole and which is affiliated with the Federation Aeronautique Internationale.

With its headquarters in Washington, the Association is in touch with Congress and with all governmental machinery that must be utilized to make laws and regulations and to promote the growth of air power.

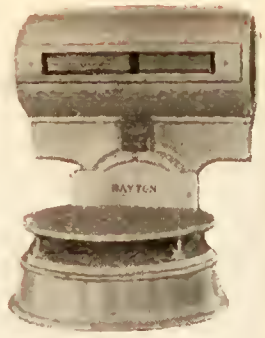
The National Aeronautic Association supports and assists commercial aviation, the air mail, the Army and Navy air forces, and all forms of worthy aeronautical enterprise. It is the only agency that can coordinate the energies of all industries and individuals who are interested in air power. It invites all who cherish the prosperity and safety of our nation to join its ranks.

The growth of the Association during the present year has been rapid. Nearly every state is now represented in the organization. Chapters have been formed in many cities.

If we are to maintain our position in the front rank of world powers, dormant public interest in this new science must be aroused. To educate the American people to the tremendous importance of aeronautics is the primary aim of the Association.

F. B. Patterson
President National Aeronautic Association.

Prominent Dayton Men Who Are Boosting Aviation



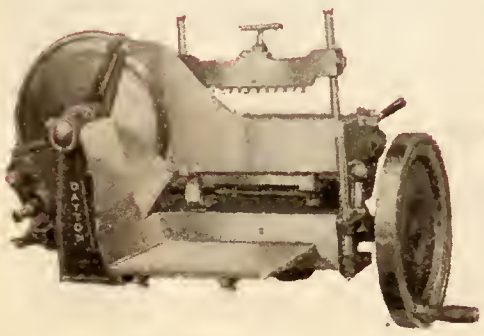
AN INVITATION

The
DAYTON SCALE COMPANY

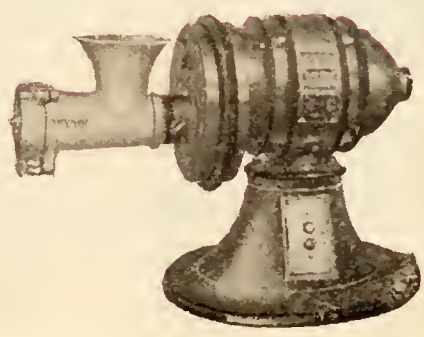
extends a cordial invitation to everyone to inspect their factory at No. 448 Huffman Avenue, Dayton, Ohio, and see how the world's finest Scales—Coffee Mills—Meat Slicers—Meat Choppers—Bread and Cheese Slicers are manufactured.

INTERNATIONAL BUSINESS
MACHINES CORPORATION

DAYTON SCALE COMPANY DIVISION
DAYTON, OHIO



When in Atlantic City, visit our permanent exhibit, at No. 729 Boardwalk



Cornwell Studios

Dayton Welcomes You

Dayton is known the world over as the birthplace of Aviation. The products of our factories have long made this city known wherever trade is carried on.

The progressive spirit and high order of our industries have brought here from time to time, thousands of people in quest of information concerning our methods.

Many conventions and events have also brought large numbers of visitors to Dayton, and I feel sure they have all left with warm words of praise for the cordial treatment they received.

The International Air Races are now being held here. This is Dayton's triumph.

As Mayor of this city, I welcome you most cordially. We are happy to have you here and will do all within our power to make your stay pleasant.

Frank B Hale

Mayor.

DAYTON-OHIO
Birthplace of the Airplane

DAYTON, Ohio makes no false claim when she terms herself the "Birthplace of the Airplane."

There is no one who now disputes the honor accorded the Wright Brothers as the builders and flyers of the first successful motor-driven, heavier-than-air flying machine. The Wright Brothers moved with their parents to this city from Greenastle, Indiana, while they were quite young. When they had grown to early youth they set up a little print shop, building their own printing press and publishing a little sheet called *"The West Side News."* They next took to repairing and building bicycles and the unique spectacle of the two "Wright Boys" pedaling their way laboriously down the main city thoroughfare on a cumbersome tandem perfected from pieces of gas pipe is still fresh in the minds of many citizens. The little work shop on the west side is still standing today.

Their first inclination toward building flying machines was evidenced when they began experimenting with kites and gliders which they flew on the open fields and commons about their home neighborhood, and then, gradually, it became a current rumor about town that "those fool Wright boys had built a flying machine."

To conduct their experiments they had preyed upon the good graces of a farmer to let them use a waste strip of ground where they could build a shop and conduct their flights away from the curious and prying public. Thus, there is marked in aeronautical history today the old Huffman prairie at Simms Station, eight miles east of Dayton, on the very site of the International Air Race event, where the airplane was really born. There is still standing here the old shed which sheltered this first make-shift flying machine, half hidden among the weeds of the bottom lands.

Before going further let us recall that the brief facts we have given will serve to show that the Wright Brothers were not trained engineers or physicists as some have pictured them. They were men who worked with their hands building every part of their machine throughout in their little shop, but guiding every piece of construction work by careful study and tedious experimenting.

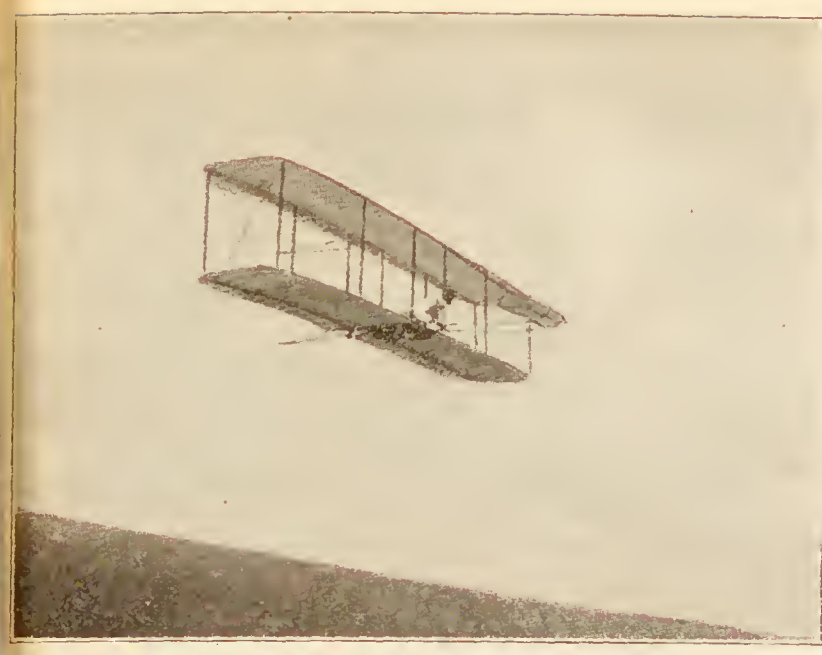
WILBUR WRIGHT ORVILLE WRIGHT

Although the Huffman prairie was not an inviting place the curious crowds became more and more common. The bolder of these sight-seers hid in the bushes with cameras and endeavored to catch pictures of the plane in the air, until the inventors fearing their valuable secrets were about to be divulged dismantled their machine, packed up their tools and moved east to North Carolina, among the lonely sand dunes of Kitty Hawk. This was indeed a forlorn region on that tongue of sand which stretches along the coast of Norfolk, between the Atlantic and Albemarle and Pamlico Sound. It is about as desolate a region as exists near civilization, only inhabited by a few fisherman and life-savers of the Government.

Here on a bleak December day, the 17th to be exact, 1903, before a little band of shivering spectators the first successful flight in a powered airplane was made. It lasted but twelve seconds but nevertheless it marked that "first chapter in the book of endless possibilities" of which Kipling speaks.

Returning to Dayton later the Wright Brothers continued their flying experiments at Huffman prairie and later built there a stronger, higher-powered machine. Many Daytonians recall the pilgrimages to this well known spot to watch the early flights of the Wright boys. They call to mind the tall derrick and the running track upon which the plane slid along as the heavy weight was dropped from the top of the tower. Those were history-making days for Dayton but she little realized it then.

It was a long time before the public and the press would give full credence to the reports of "man-flying" at Dayton. This, was to be expected for had not Maxim spent $125,000 on the problem and given up its solution as an impossibility? Had not Langley, after years of experimenting been compelled to abandon his work because the Government refused to assist him further? Had not Lilienthal and Pilcher lost their lives in gliders? It was little wonder that the public put little stock in these flying stories, yet after all it was strange that news reporters who never let big features slip were caught napping and missed many of the first remarkable flights. Indeed it was not until 1908



A view of the original Wright Glider, or motorless flying machine, 1900.

The Wright Model "A" the first successful airplane in flight at Kitty Hawk, North Carolina.

hen with Orville making flights in America and Wilbur in France that the press began to tell astonishing tales about the Wright Brothers flying achines.

Happily both lived to see in the brief space of a ecade their flying-machine develop under their vn hand from a crude gliding mechanism into a st, motor-driven artificial bird; lived to see the alization of a dream that has haunted inventors er since the world began; lived to see themselves nored by kings and potentates, legislators and ientists, statesmen and artists the world over.

A hundred years from now, no doubt, the world ll scarcely accord to the inventors of the flying achine as much honor as has been given some of e other inventions, such as the telegraph, but if we ke into significance the great and disheartening uggle that was waged to conquer this problem feel justified in placing the names of the brothes, Orville and Wilbur Wright, along side those of ch men as Morse, Bell, Fulton, Bessemer, Watt d Arkwright.

raphic Account of Early Flights of Wright Brothers, Ft. Myer, 1908-09

* * * One beautiful still morning about 6 o'clock . Wright and myself left the Cosmos Club and k the car to Georgestown, where we had breakt. We boarded the Ft. Myer's trolley and arrived the field. Not a person was in sight except the diers cleaning the guns of the field battery, but . James Means, of Boston, came on the next . The conditions for the flight were perfect. . Taylor, Mr. Wright's mechanic, got out the chine and it was placed on the starting rail. The ght was raised, and Mr. Wright took his place. ne of us expected anything more than a short ht down the field, possibly a circle. The mane was released, and away it went, rising higher higher, circling when he came to the end of the d and continuing round. I had taken the time the starting and marked on the back of an enop each circle of the field.

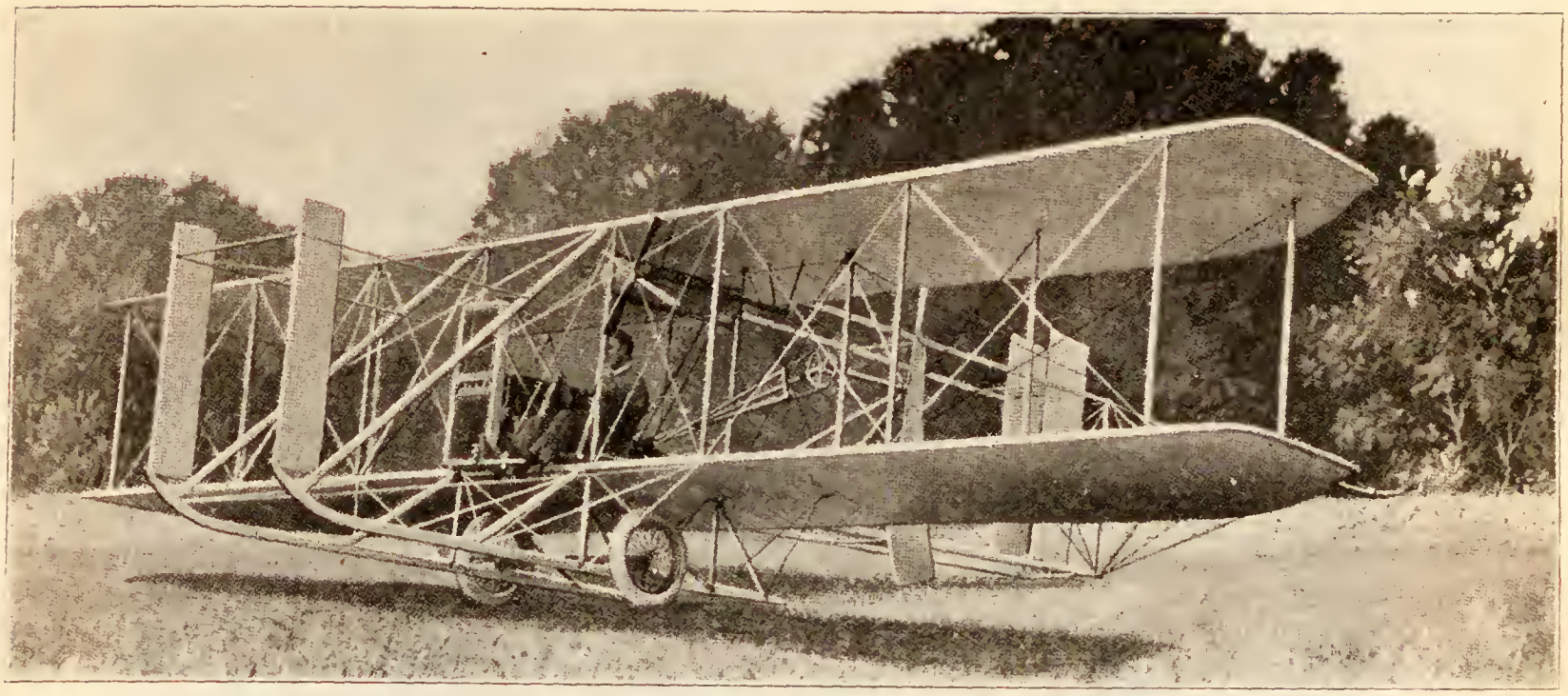
From a position of strained attention and fixed e, Mr. Wright gradually became more confident and comfortable; round and round he went for fully twenty minutes, and then we began to realize that something wonderful was taking place. Thirty minutes passed; we could hardly believe it. Mr. Taylor came up and said: 'Don't make a motion, if you do, he'll come down,' and we all stood like statues, watching the flying man, every nerve as tense as our bodies, as though we were running the machine ourselves.

"Mark after mark I made on the back of the envelop—so many that I had lost track of the number; it seemed an age since the machine started, and it appeared to be fixed in the sky.

"We were impressed that it could circle on forever, or sail like a bird over the country so positive and assuring and complete was the demonstration. We knew that the problem of flight by airplane had been solved.

"The newspaper reporters had gotten word of the fact that Mr. Wright had gone out for a flight and they telephoned to the airplane tent to learn if he was going to make the attempt. The answer went back: 'Yes, he is in the air now and has been flying more than half an hour!' Their rush to get 'the story' may be imagined. It was telegraphed to every city in the country, and cabled abroad. The news of what was happening spread like wild fire.

The old Wright Hangar on the Huffman Prairie, just east of Dayton, where the first Wright airplane was assembled and sheltered. This tumble-down shed, still standing, marks the authentic birthplace of the airplane.



Orville Wright, at the completion of a flight in one of the early types of their flying machine.

"The senators and government officials in Washington telephoned to ascertain if Mr. Wright would give another demonstration. They were thoroughly aroused now and hastened out to Fort Myer, even those who had failed to be interested when Captain Baldwin was making his record flights with the War Department's dirigible balloon.

"In the afternoon the largest number of representative people gathered that had ever been seen there before. Before this great crowd Mr. Wright repeated his demonstration of the morning making a flight of 1 hour 7 minutes and on one occasion carrying Lieutenant Lahm as a passenger."

Another Flight at Ft. Myer

"All eyes are turned toward the 'airplane shed,' (now called 'hangar') and soon the white wings of the machine appear. It is turned around on its little truck which supports it. The wheels are placed under it, and the machine is pushed slowly up the field to the starting point. On its arrival, it is placed on the starting rail. The Wrights are seen walking across the field to join the little group of officials and members of the Signal Corps, forming the Board who are conducting the trials on behalf of the Government.

"Mr. A. Holland Forbes, acting as president of the Aero Club of America is among them; he has been asked to assist in the timing of the event as a disinterested party.

"There is a commotion in front of the President's tent; an auto drives quickly up, the Philippine footman opens the door and President Taft steps out with a hearty smile.

"The Signal Corps men raise the weight, and the end of the starting rope is fastened to the machine. Mr. Orville Wright now steps to the forward side of the machine, while his brother, Wilbur, and their chief mechanic go to the rear of the airplane; at a given signal they turn the propellers and start the motor. Mr. Orville Wright adjusts the spark and listens intently while the motor runs steadily, the propeller creating a 'draft' (now termed 'slipstream') at the back that is felt even among the bystanders back of the ropes. All being in readiness Lieutenant Lahm leaves the little body of officers and steps quickly to the side of Mr. Wright. It is necessary for him to crawl in under the wires of the machine which cross in front of the passenger. He takes his seat in the center of the machine, in order not to disturb its equilibrium.

"Mr. Orville Wright takes his seat on the left, gives one or two words of instruction to Lieutenant Lahm about retarding and advancing the speed of the engine, grasps the levers, and the machine is released. It glides gently down the track, gathering headway and increasing its speed every moment until it reaches the end of the rail.

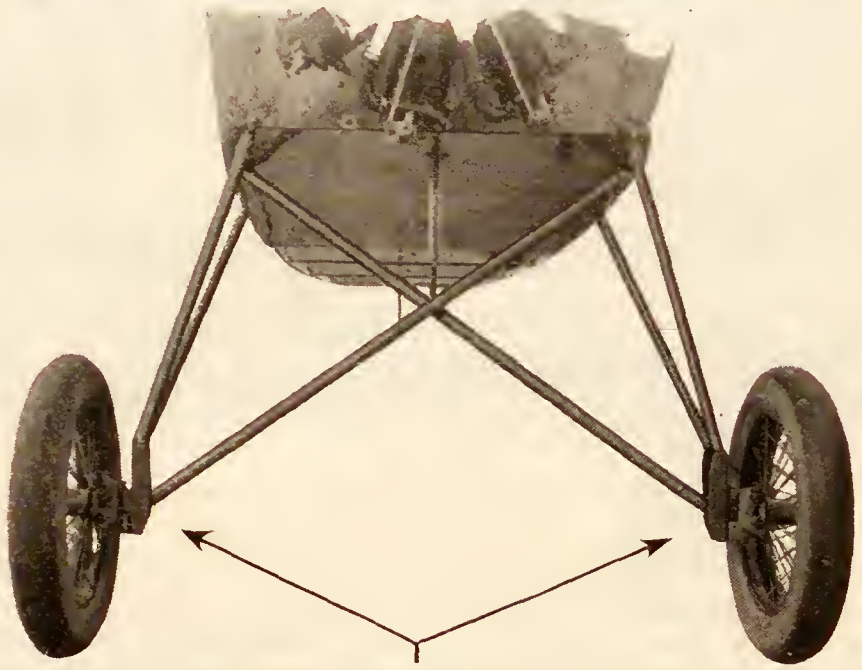
"The forward planes are raised, the machine commences to climb in the air and to fly swiftly down the field toward the airplane shed, where Miss Katherine Wright and her friends are seated; it turns gracefully and circles over the trees of Arlington Cemetery; wheeling at the upper end of the field again and passing directly over the President's tent. President Taft rises to his feet and watches the flying machine intently.

"Around and around it circled, each circle taking about one minute in time, with hardly any variation. For the first ten minutes the machine did not run quite smoothly. Mr. Wright explained to me that he did not get the levers set quite right for the added weight of the passenger, but soon found the adjustment and then had no further difficulty.

"How can I describe the beautiful, white, graceful, curving surface of this perfect and characteristic machine. The nearest thing that would give the idea would be a combination of a sleigh with its runners, and a yacht with its sails in the horizontal position instead of the verticle. It goes away from you and you look edgewise at the planes, they appear as wings of a bird; with the sleigh-like runners underneath. The two passengers sit on this light structure which seems scarcely strong enough to support them.

"As it circles over your head you look up at the wide expanse of the wing surfaces, with the sun

Cut of Landing Gears Attached to Airplane Showing The Use of Malleable Castings



A shock-absorbing device on a landing gear in which a major portion of the material is certified malleable iron produced by the Dayton Malleable Iron Company.

Human progress has been measured by the growth of transportation and industry, and those institutions have grown only to the extent that improvements in iron and steel products have permitted.

From unromantic surroundings, out of the heat, dust and fumes of foundries, comes a product that assumes great responsibility when used for vital parts of automotive, railway, farm implement and general industrial construction. The use of certified malleable iron has advanced to the point wherein it is used on every modern vehicle.

Cut of Casting Before Hammer Test
Extreme ductility enables a Certified Malleable Casting to withstand the most severe punishment without fracture.

Cut of Casting After Hammer Test
The same casting after cold bending under the hammer. It is difficult to realize that a casting can be so treated without showing some signs of fracture.

THE DAYTON MALLEABLE IRON COMPANY

Annual Capacity - - - 90,000 Tons

General Offices: Dayton, Ohio

WORKS

DAYTON IRONTON CANTON BUFFALO

In June, 1909, Dayton, Ohio, the home town of the Wright Brothers offered to these noted sons one of the most spectacular and stupendous welcomes ever recorded in history. The photo here shows the parade in the height of the celebration.

hining on them, and the dark outlines made by he ribs, it looks like the sails of a tiny racing acht. It also makes you think of some large bird n search of prey, its cry a harsh sound very much ike the noise made by a mowing machine as it s driven about the hay field.

"The hour mark is reached and a great shout goes p from the people on all sides of the building. President Taft claps his hands, but the welcome ound seems to make no impression upon the men ar away from the earth, intent only upon beating ne world's record of 1 hour 9 minutes 40 econds, made by Mr. Wilbur Wright earlier in ne year. On the breaking of this record Mr. Wilbur Wright runs out and waving a handkerchief shouts: 'Give him a cheer, boys!' and the cheer goes up from the crowd of officers in the center of the field. This meant that Orville Wright has beaten his brother's record and is now setting a new mark of his own. Soon it is seen that the airplane is descending lower and lower; it skims the gun sheds, and seems about to collide with the airplane shed, but it glides easily over and at the end of another circle strikes the ground. The motor is shut off, and the passengers alight which completes the endurance flight of 1 hour 12 minutes 40 seconds."

—By A. Post, *World's Work, Special Permission.*

Speakers' and Reviewing Stand at Wright Brothers' Celebration, June, 1909. Celebration held in Dayton, Ohio, shortly after triumphant return from Europe of the famous fliers.

MAN'S DEVELOPMENT OF VEHICLES OF LOCOMOTION

THE word *rapid* is purely relative. When old Peter Voorhees, during the year 1840, established his stage-coach lines between Dayton and Cincinnati, rapid travel was made possible be-

An Early Stage Coach.

tween the two cities. Changes of horses every few miles made this practicable. The steaming animals fairly flew from one relay post to another, so that the trip was made in little or no time—*as time went in those days of long ago.*

But then even this was a long trip to make—this sixty miles from early Dayton to early Cincinnati. Yet today this same trip is a matter of minutes, not hours. Man's development of vehicles of transportation has been rapid. And rapidly do we travel today. The story of these changes from old ways to new, is one that brings out all of the romance of a dream.

Stephenson's First Railroad Train.

Yet we have but to look about to know that here is a dream come true.

Slowly—and yet rapidly for then—the old prairie schooner crawled across the plains. No more do we see those ancient "tents on wheels." They have been replaced by modern "palaces on wheels"—the Pullman of today.

The old Oregon Trail will see no more the wild rangers and the cattle rustlers of yesterday. It is a great motor highway today. The chug-chug-chug of the gasoline engine is the wildest sound one hears. And the cars one sees are not those of the last century, but one and all represent efficiency, power, speed, durability, and even elegance.

You who read may often have disembarked with the other passengers and helped the poor little mules lug the recent (now old and obsolete) street-car up the grade. The descendants of those sturdy street-car mules of yesterday live with but a memory of a past that is gone forever—for electricity came forward through development to take their places.

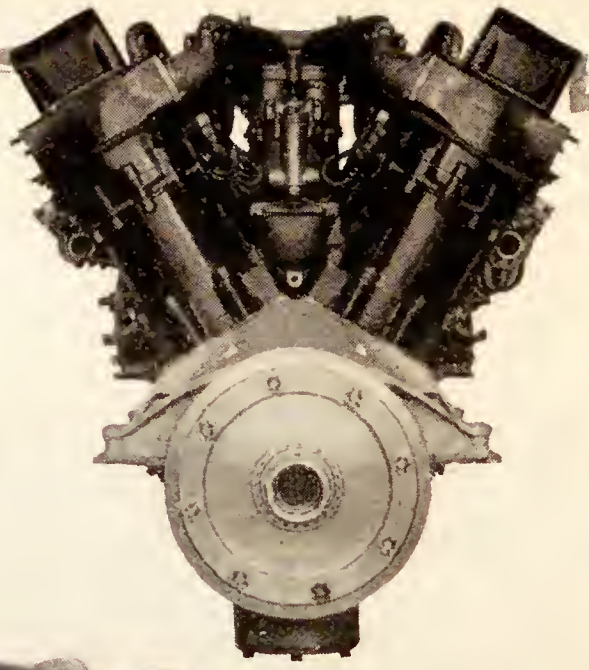
The old canals that netted their weary way across the land, are gone. They have been filled in to make long boulevards or building sites for modern homes. The old canal boats, rapid in their way in their day, are no more.

We even may imagine that Robert Fulton, when first he began his experiments with steam navigation, little dreamed of ocean navigation as it is accomplished today in a big liner. Nor—in all likelihood—did Stephenson in his dreams for a locomotive see in his visions such complete accomplishment as is embodied in any one of the great engines that so surely and so swiftly sweep across the continent with the assurances of arriving day after day in San Francisco on time.

And so it is also with aviation, that most thrilling and at the same time most wonderful of man's development in transportation. When Orville and Wilbur Wright first began their experiments, little did they dream of the great, unharnessed power that they were bridling for man's good. But so it has always been, and you who read this book have lived to see the day of practical aviation come true!

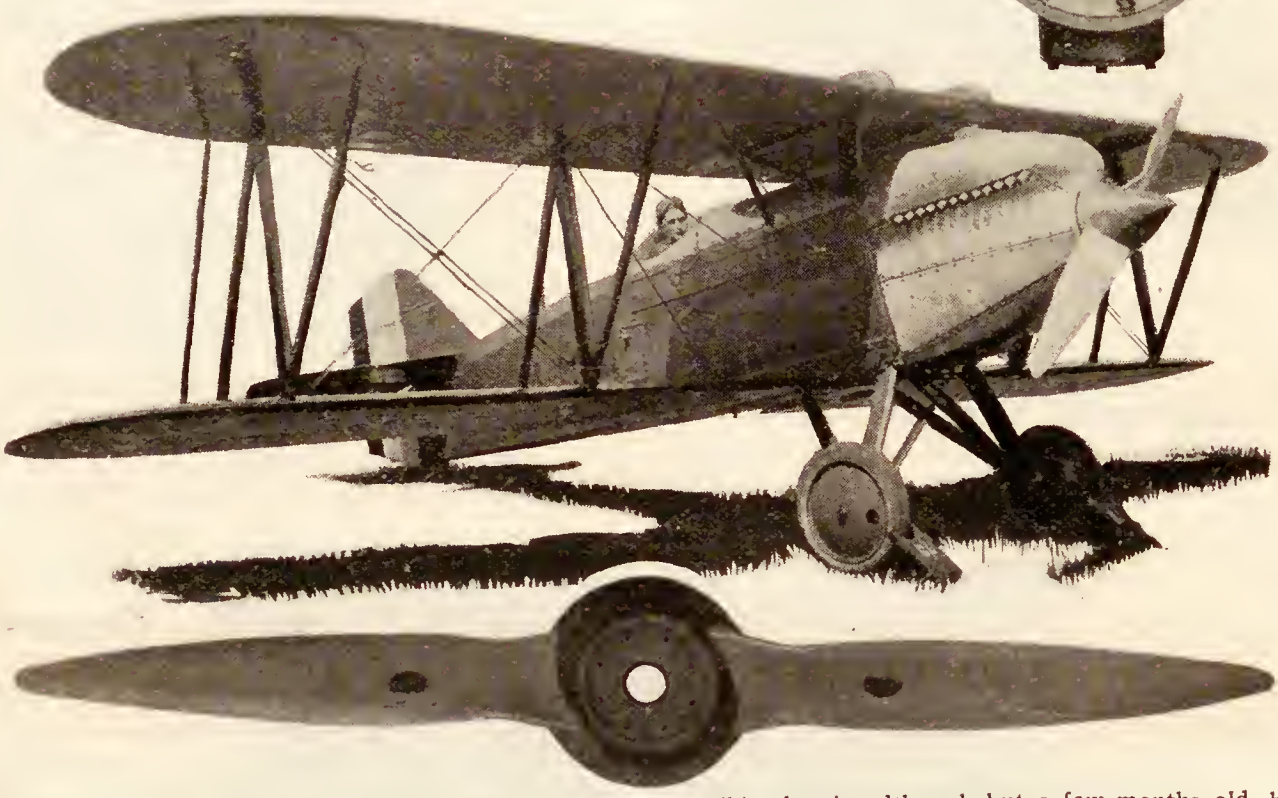
Great is the wonder of it—especially so since aircraft have now been developed to the point of SAFETY and COMFORT.

An Early Model Airplane.



Curtiss

Speed with Safety



WHEN the Army Air Service decided to demonstrate to the world the mobility of American Aircraft, they chose a Curtiss product.

LIEUTENANT MAUGHAN'S recent flight from New York to San Francisco, between the hours of dawn and dusk, was accomplished in a Curtiss designed and built Pursuit plane equipped with a Curtiss D-12 motor and a Curtiss-Reed one-piece duralumin propeller.

THIS three-fold combination is indeed hard to beat, as each one preeminently leads its field. The plane, of Curtiss design includes all the essentials necessary for high speed racing and high performance military aircraft, among which are:

Extreme maneuverability with comfort and visibility to the pilot at all times;

Multispar cellular wings, with covering of spruce planking instead of fabric—shrapnel proof—no cloth covering to tear off;

Steel tubular fuselage with a readily detachable engine mounting;

Split axle type of landing chassis, in which shocks are absorbed by rubber discs acting in compression. This chassis, although but a few months old, has already been adopted as the standard type.

Quickly detachable wing or cellular radiators eliminating resistance heretofore required for cooling;

Oil temperature regulator, which permits instantaneous starting, even in the coldest weather, and then maintains the proper temperature of the oil while in flight.

THE Curtiss D-12 motor, in addition to holding all the speed records of the world, now has to its credit Lieutenant Maughan's achievement. On account of the small frontal area of the D-12 for the first time the size of the pilot rather than the engine controls the size of the fuselage.

THE Curtiss-Reed one-piece duralumin propeller, the safest and most efficient propeller ever tested, is unaffected by hail or rain, tall grass, small particles, age or climatic conditions. It, too, has done its part in winning these high speed and endurance tests.

THE Curtiss Pursuit as a fighting unit has no competitor in the world. It has set new standards for plane, motor, and propeller.

Curtiss Aeroplane & Motor Company, Inc.

Garden City, L. I. Buffalo, N. Y.

FIRST INTERNATIONAL AIR RACES

Rheims, France, September 1909

Courtesy World's Work.

(1) Henri Farman, a winner in the first International Air Races, seated in his unique biplane. (2) Glenn H. Curtiss, winner of the Gordon-Bennett speed classic at the Rheims meet 1909. (3) Pilot Paulham rounding the pylon at the tremendous speed of fifty miles per hour at the Rheims races. (4) A part of the crowd of 300,000 spectators who witnessed the flying wonders at Rheims in 1909.

MANY memorable things have come to pass in aviation since that epochal event of some fifteen years ago when some thirty-eight entries representing different nations met on the plains of Bethany at Rheims in the first International Races for flying machines.

The favorites of that day were such well known pioneers as Blériot, who had crossed the English Channel; Latham; Sommers and Glenn H. Curtiss, the American.

In the accounts of this event, which appear unique to us now, we read of the amazement at a spectacle no one had ever before witnessed—six men flying around in circles, with perfect control of their machines, even in a breeze of twenty-five miles an hour.

Trying for the Prix de la Champagne M. Paulin in a Vosin biplane astonished the throng by flying 30.7 miles around the course in 1 hour 3 minutes. But the honors of the first day went to Glenn Curtiss who made a record for one lap—a distance of 6.2 miles in 8 minutes 35 seconds. This record was beaten the next day by Blériot who made the lap in 8 minutes 4 seconds.

The pilot, Paulham, came into prominence by remaining in the air 2 hours 43 minutes 24 seconds and covering a distance of 81.35 miles, the longest any man had remained in the air up to this time. This beat Orville Wright's record of 73 miles without a stop.

On the next day Curtiss again tied Blériot's record for one lap while Huber Latham bettered the record of Paulham, going a distance of 95.01 miles in 2 hours 18 minutes 2 seconds. While traveling at this speed in the strong wind it is said the wings of his flimsy machine fluttered like a bird. This record was not of long standing for on the very next day of the meet Henry Farman, in a machine of his own design, made a flight without a stop of 118 miles.

There were three entries in this race, Farman, Latham and Sommers. Farman flew until dusk, at which time the other two entries had dropped out. At 7:30 p. m. the official timing ceased and darkness crept over the field. Spectators could no longer discern the plane in the air and lanterns were placed on the turning pylons to guide the pilot. At last he fluttered down safely amid the cheering throngs.

On the next day the Gordon-Bennett Cup—the International speed trophy for the plane making the fastest time over the 20 kilometer (12.41 mile) course was run. The weather was perfect.

In the very first trials run by Glenn Curtiss the white ball, signifying that another record had been broken, was run up. Curtiss in his speed ship rose to the height of 45 feet and swept down over the line not more than 12 feet from the earth at terrific speed, making the distance in 7 minutes 55½ seconds. In the next trial he rose higher, making the first lap in 7 minutes 57 seconds, then opening wide the throttle of his motor he swept down from a height of 100 feet, making the total distance in 15 minutes 50 seconds. Both Blériot, Lefebvre (in a Wright machine) and Latham tried vainly to beat the pace set by Curtiss.

On the last day of the events Blériot's machine caught fire and exploded, Blériot escaping with severe burns.

Curtiss again won the honors in the three-lap speed contest, he making the distance in 23 minutes 29 seconds.

Farman won the passenger carrying contest, carrying two passengers. Huber Latham won the altitude contest, flying to a height of 490 feet, the vast throng of 300,000 people watching him against the background of the full moon, which furnished a fitting tableau at the conclusion of the great meet.

RECORD OF RESULTS

Longest flight—Farman—111.78 miles.
One-lap speed (10 kil.)—Blériot—7 min. 48 sec.
Two-lap speed (Intern'l cup)—Curtiss—15 min. 50 sec.
Three-lap speed—Curtiss—23 min. 29½ sec.
Passenger—Carrying contest (two passengers)—Farman—10 min. 39 sec.
Altitude flight—Latham—490 feet.

Present Day Records

DISTANCE: Lts. Macready and Kelly, U. S. Army, T-2, 2516.55 miles, Wilbur Wright Field, April 16-17, 1923.

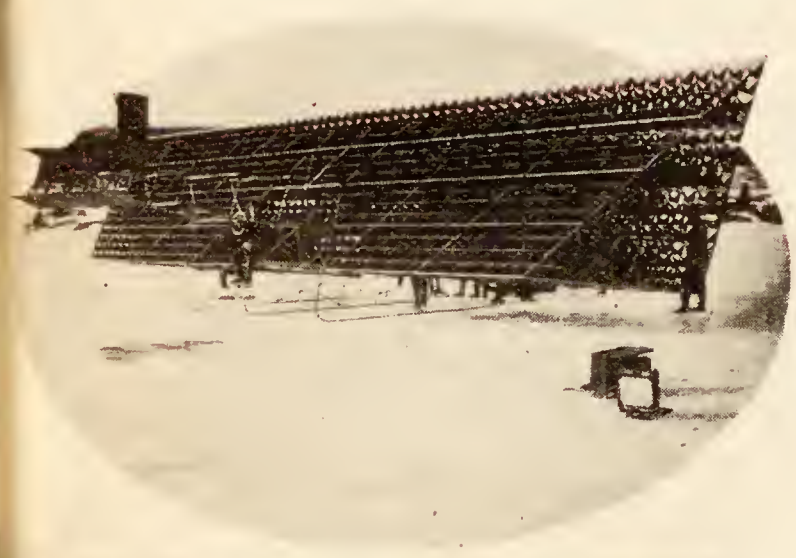
SPEED: Lt. A. J. Williams, U. S. N., Curtiss Racer R-2C1, at Mitchel Field, November 4, 1923—266.59 miles per hour.

ALTITUDE: Sadi Lecointe (France) Nieuport Delage, at Issy-les Moulineaux, France, October 30, 1923—36,555 feet.

The Barling Bomber has carried 6612 lbs. of extra load over 5000 feet in the air which might be compared with the two passenger record of Farman.

Table 1—Past AIR RACE Record Events

YEAR	PLACE	PILOT	COUNTRY	PLANE	H. P.	M. P. H.
1909	Rheims, France	Curtiss	United States	Curtiss		47
1910	Belmont, N. Y.	Graham-White	Great Britain	Blériot	100	61
1911	Isle of Setty	Weyman	United States	Neuport	100	78
1912	Chicago	Vedrines	France	Deperdussin	140	103
1913	Rheims, France	Prevost	France	Deperdussin	160	147
1920	-------- France	Sadi Lecointe	France	Neuport	300	190
1920	Long Island, U. S.	Mosely	United States	Verville Packard	630	190
1921	St. Louis, U. S.	Acosta	United States	Curtiss Navy	400	205
1922	Detroit, U. S.	Maughan	United States	Curtiss Army	460	224
1923	St. Louis, U. S.	Williams	United States	Curtiss Navy	400	243.67



EARLY DEVELOPMENTS IN AIRCRAFT
(1) "Cygnet"—a tetrahedral kite designed by Dr. Alexander Graham Bell, 1909. (2) "Silver Dart," built by J. A. D. McCurdy, 1909. (3) Langley Airplane. (now in Smithsonian Institute). (4) "White Wing," J. A. D. McCurdy, 1908.

HOW TO JUDGE THE AIR RACES

AN ASSISTANT Starter is assigned to each plane in the race. He has three starting flags, viz., red, white and blue. The Chief Starter has large flags which are visible to the Timer's Stand. When the Referee has all planes lined up for the start of the race, the Chief Starter raises his red flag fifteen minutes before the start of the race. This is a signal indicating that all engines

Judges Stand at the Air Races.

shall be started immediately. As soon as these are running, which shall not be more than fifteen minutes later, the Assistant Starters raise their red starting flags indicating to the Chief Starter that their plane is ready to start.

However, should there be engine trouble to any plane, the Assistant Starter for that machine raises a blue flag indicating that his pilot desires a deferred start. The pilot for that plane then has one hour in which he may get away.

As soon as all engines are running, which shall not be later than the starting time for that race, the Chief Starter raises the white warning flag in addition to the red flag, which signifies that the get away signal for the first plane will be given in ten seconds, giving the mechanics time to draw the blocks from under the wheels. Each second will be counted by lowering the red flag, the get away signal for the first plane being the lowering of both the red and white flags together. As soon as the first plane has started the Chief Starter moves to the next machine and raises both red and white starting flags indicating that the get away signal for that plane will be given in ten seconds. The same procedure is followed for each airplane in line for start.

The start of each race will be indicated by sending off an aerial bomb salute.

Timer's Stand Signals

When the Chief Starter raises the red starting flag an official on the Timer's Stand also raises a red flag to indicate that everything is in readiness for the start. This means that all officials are at the turning points on the course and that the Electric Timing Apparatus is operating. The Chief Starter then proceeds to start the planes in their proper order. Should anything occur in the Timer's Stand or on the course which might delay the race, a blue flag will be displayed on the Timer's Stand as an indication to the Chief Starter to hold the planes until he receives the red answer signal above referred to.

In case a plane is delayed in starting and the pilot wishes to start when another airplane is approaching on the course, a yellow flag will be displayed on the Timer's Stand warning the pilot to delay his start until the racing plane has passed out of the danger zone.

Score Boards

Planes will start as indicated on the scoreboards; the lowest numbers starting first in each race. The starting line which also serves as the finishing line is indicated in white on the Field directly in front of the Timer's Stand. The Starting time is taken when each plane flies across this line at the beginning of the race and at the end of each lap his time is taken as he flies across the line and his speed in miles per hour for the distance he has covered, i. e., one lap, two laps, etc., will be posted immediately on the score boards.

As soon as each airplane has completed one or more laps, the speed of the airplane will be figured in miles per hour for the distance flown and this

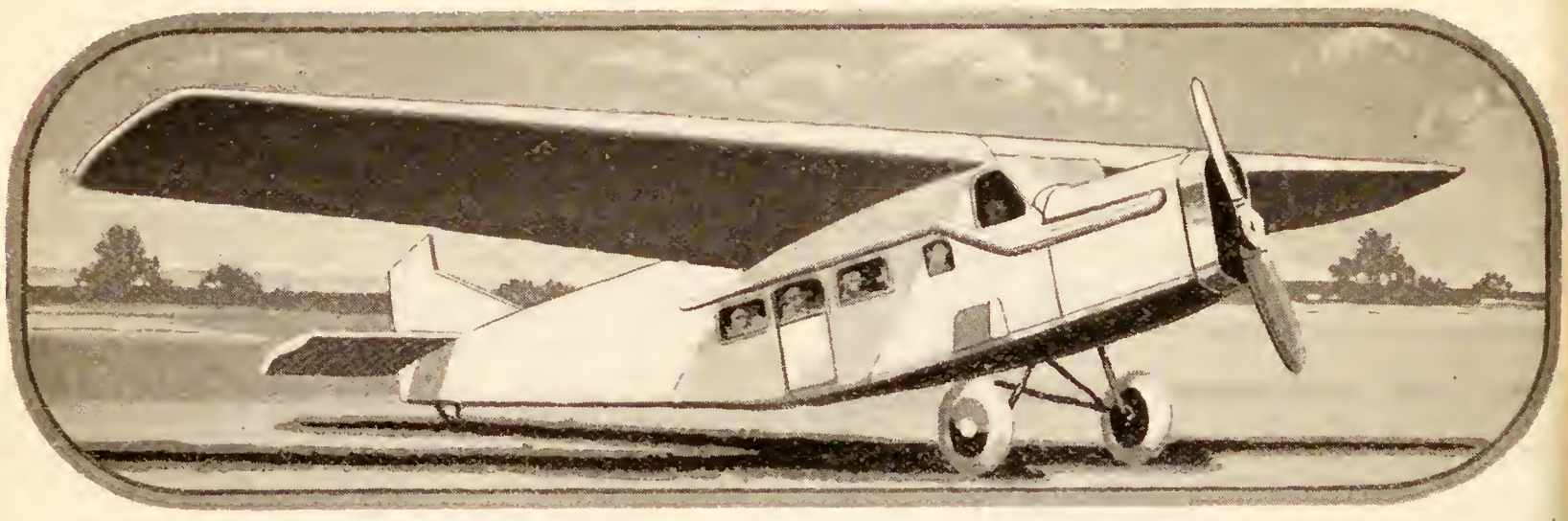
A line-up of Planes at the Air Races.

speed will be immediately written in the proper spaces on the scoreboards. In this manner the spectators may know:

(1) How many planes have started, how many laps they have flown and the rate of speed they have been able to maintain for the distance indicated.

(2) The spectators may know at all times if any contestants are still to start; or if the entries have been withdrawn due to mechanical or other trouble.

(3) At all times the spectators may know which contestants have made the fastest time of any or all laps and, therefore, which contestant up to that time is the winner of the trophy, provided his performance is not excelled by some contestant who has been forced to delay his start.



All Planes Reported "On Time"

FLYER	EN ROUTE	DUE	WILL ARRIVE	WILL DEPART
EAGLE LIMITED	FRISCO - NEW YORK	10.30 P.M.	10.30 P.M.	10.45 P.M.
EAGLE LIMITED	NEW YORK - FRISCO	7.10 A.M.	7.10 A.M.	7.30 A.M.
THE NIGHT HAWK	DENVER - CLEVELAND	12.01 A.M.	12.01 A.M.	12.30 A.M.
THE NIGHT HAWK	CLEVELAND - DENVER	11.05 P.M.	11.05 P.M.	11.25 P.M.
THE FALCON	CHICAGO - NEW ORLEANS			8.00 P.M.
THE FALCON	NEW ORLEANS - CHICAGO	10.30 A.M.	10.30 A.M.	

THIS imaginary bulletin board of today is destined to become a reality of tomorrow. Last year's non-stop flight from coast to coast and the successful trial trips of airmail pilots between New York and California presage the daily flight of mail and passenger planes on regular schedules between many of the larger cities.

Passenger airplanes flying over Lake Erie between Cleveland and Detroit have established an almost perfect record. They have carried thousands of passengers without mishap and on scheduled time. Commercial aviation is unquestionably destined to play a great part in the affairs of this country

To insure safety and to maintain schedules uniform high quality lubricating oils and gasoline are essential. The Standard Oil Company [Indiana] having long since recognized this fact, set its technical staff to work to develop the oils and gasoline which would best fill the demands of aviation. Their fund of experience in refining and the vast resources of the company were brought to bear on the problem, with the result that Stanolind and Superla Aero Oils and Stanolind Aviation Gasoline were developed, produced, and are now to be had on every flying field in the middle west where their uniformity, efficiency and absolute dependability are recognized by all flyers.

Our big new 48-page Aviation book contains data of great value to every airman. It gives you charts of flying courses, landing fields, comparative figures on different makes and models of aircraft—much of which is compiled here for the first time. Every flier may have a copy on request.

STANDARD OIL COMPANY
(INDIANA)

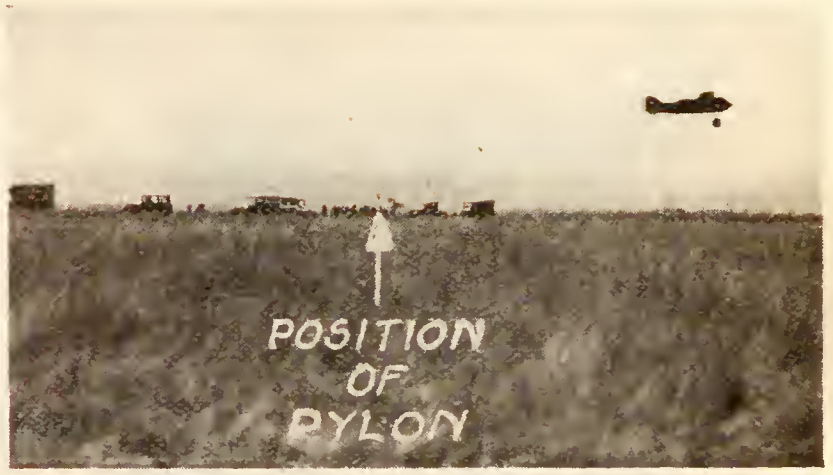
910 S. Michigan Avenue **CHICAGO, ILLINOIS**

Race Supervision

All aeronautical events, in order to be officially recognized, are controlled and conducted under the rules and regulations of the Federatione Aeronautique Internationale, which is the international sporting body of the aeronautic world and which is represented in the United States by the National Aeronautic Association of Washington, D. C. This association supervises all races, provides for proper timing and homologates all records.

Foreign Attaches, visitors at the Air Races.

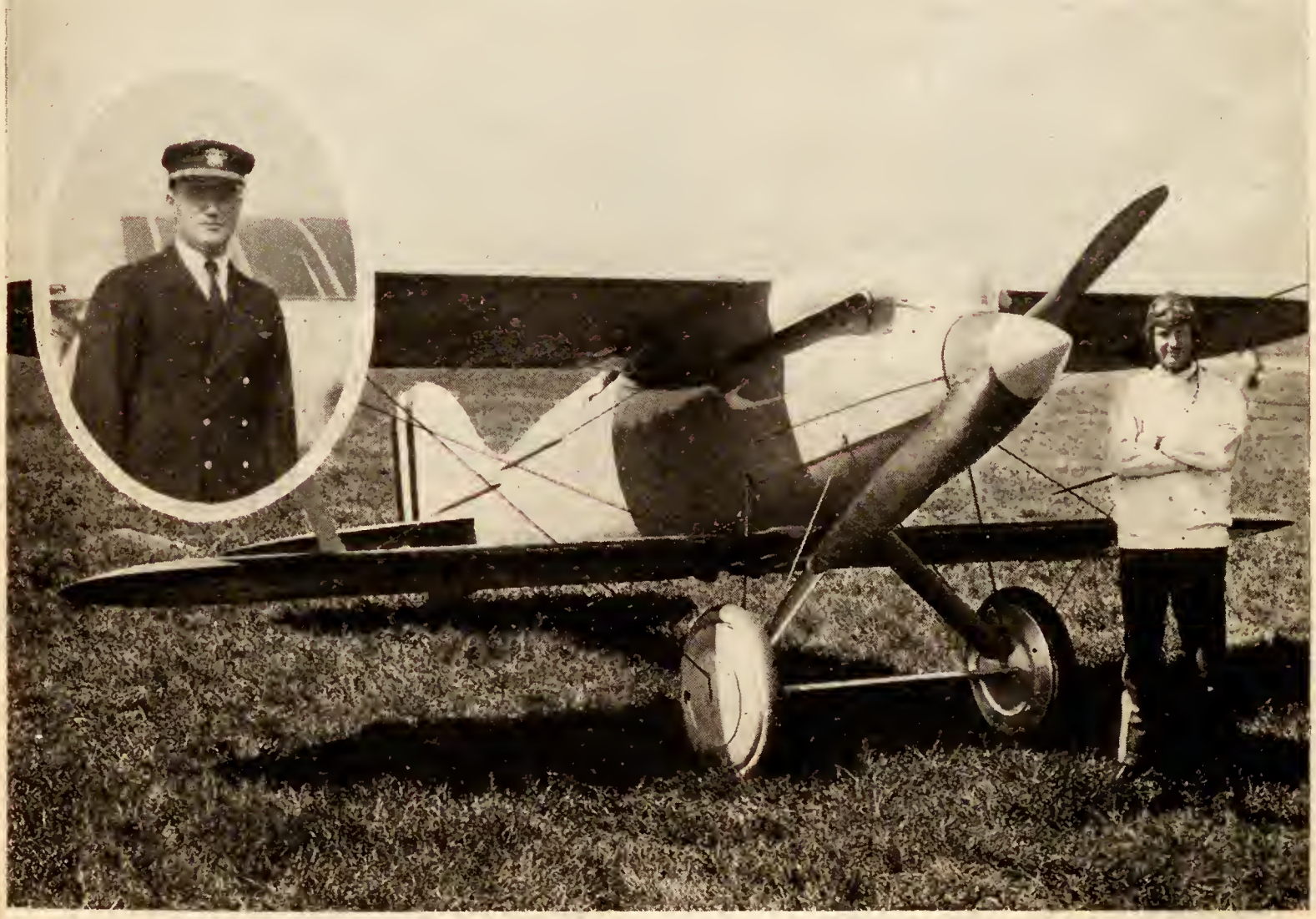
The International Air Races at St. Louis have been sanctioned by the National Aeronautic Association and are conducted under the rules and regulations of the F. A. I. The Official Timers, Mr. Odis Porter and Mr. Harry Knepper use a certified



Modern Race planes move too fast for the stop-watch timer. As this plane passed a pylon a timer pressed a camera shutter instead of a stop watch; the plane was too swift for human action.

electric timing apparatus of which there is only one of its kind in the world. This device which is controlled by a ship chronometer, is extremely accurate. It records the time that each plane crosses the starting and finishing line and prints the time thus taken, on a strip of paper, in hours, minutes, seconds, and hundredths of a second.

All turning pylons are coupled to the Timer's Stand with a continuous telephone circuit. The judges stationed on each of these turns is in constant communication with the telephone operator on the Timer's Stand and reports immediately each time a plane turns a pylon; also if there are any accidents on the course.



The Curtiss Navy Racer—winner of the 1923 Pulitzer Race and developing the tremendous speed of 243.67 miles per hour. Standing by the "blue streak" is Lieut. H. J. Brow, U. S. Navy pilot, who took second position in the race with a machine of the same type. In the insert is shown a photo of Lieut. Alford J. Williams, Jr., U. S. N., winner of the Pulitzer Race. He succeeded Russel R. Maughan, U. S. Army, as "The Speed King of the World."

DAYTON, THE CENTER OF AVIATION

Touring the City From the Air

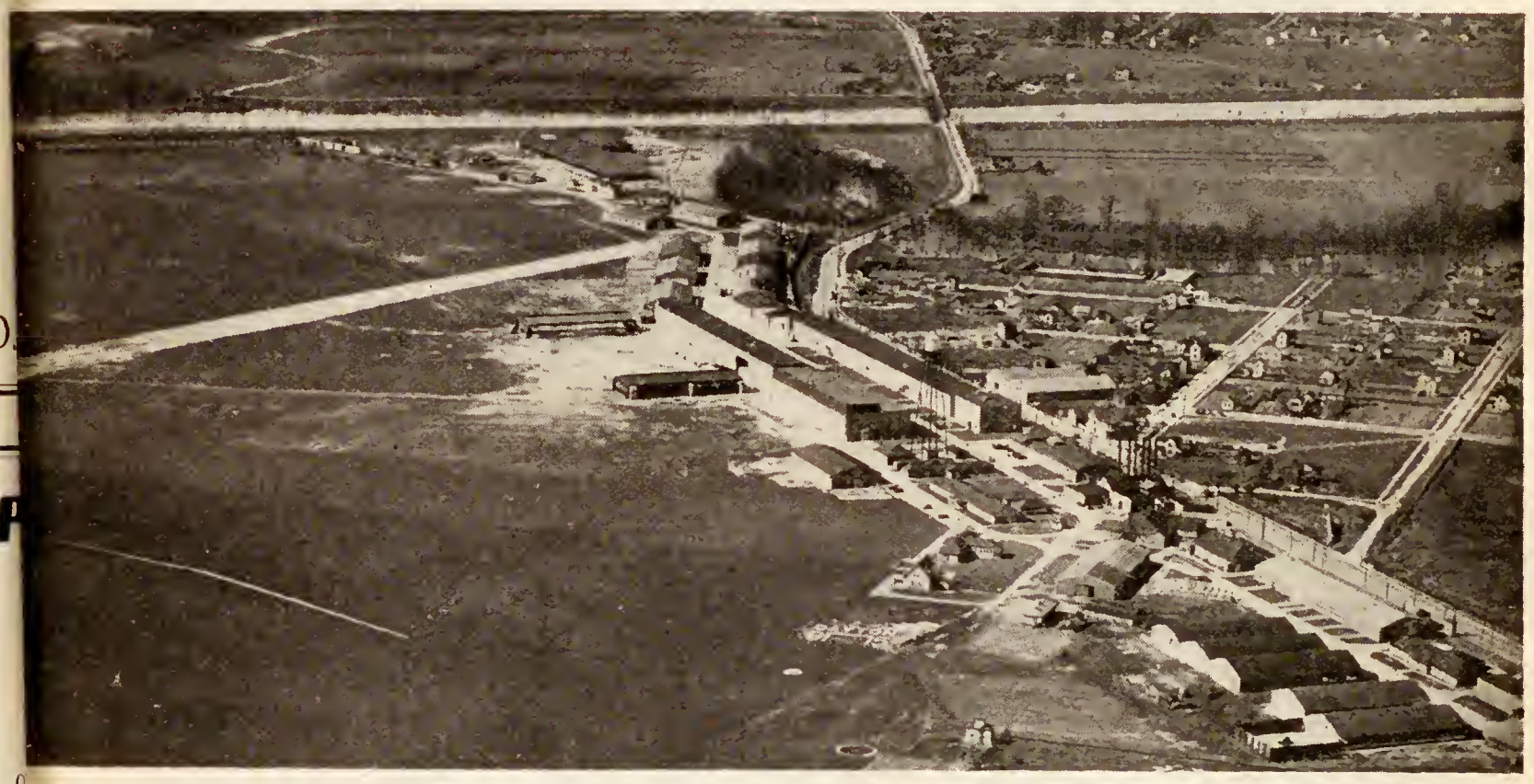
WITHIN a radius of six miles about the city of Dayton there are no less than six flourishing flying fields. The largest of course are the two Government stations—McCook and Wilbur Wright Fields which employ hundreds of people.

A short way to the southeast of the city is found Johnsons' Flying Service, Incorporated, one of the most popular and reliable commercial concerns which also maintains another flying field at Buffalo.

To the south of the city on the site of the old "South Field," well known in war days when Dayton-Wright was running full blast is found Rhine-

The expanse of sky above the city of Dayton is dotted throughout the day with both commercial and military aircraft while during the night the vibrant drone of the airplane motor in the dusky heavens and the long revolving silver shafts of light from the electric beacons at McCook Field at once identifies the city with an ultra-modern aspect.

In order to view the city of Dayton to the best advantage, there is nothing to equal an aerial trip which is quite easy to be had from any one of the half dozen commercial flying fields. Let us assume then that we are viewing the city from aloft with Walter Snypp, our amiable and instructive assistant manager of the Chamber of Commerce,



Aerial view of McCook Field, where the Engineering Division, Air Service is located. Here a major portion of all Army Air Service experimental work and testing is performed by a corps of the finest engineers and most highly trained test pilots in the world.

t-Whelan Company, Incorporated, both members which firm like that of Johnsons' Flying Service, ., are former well known U. S. Army pilots.

Wilbur Wright Field, built during the war period a few miles east of the city where the Wright thers about twenty years ago proved to the sternation of the entire world that they had stered the art of navigating the air. The great vernment flying field is named after the deceased ther, Wilbur Wright. It is considered to be of the most ideally perfect landing fields in the ted States. It was from this field that many he world's greatest speed and endurance records e recently made. Here aircraft of every descrip- is found, also all kinds of material for supply- Air Service stations over the world. Wilbur ght Field incorporates the Fairfield Air Inter- iate Depot.

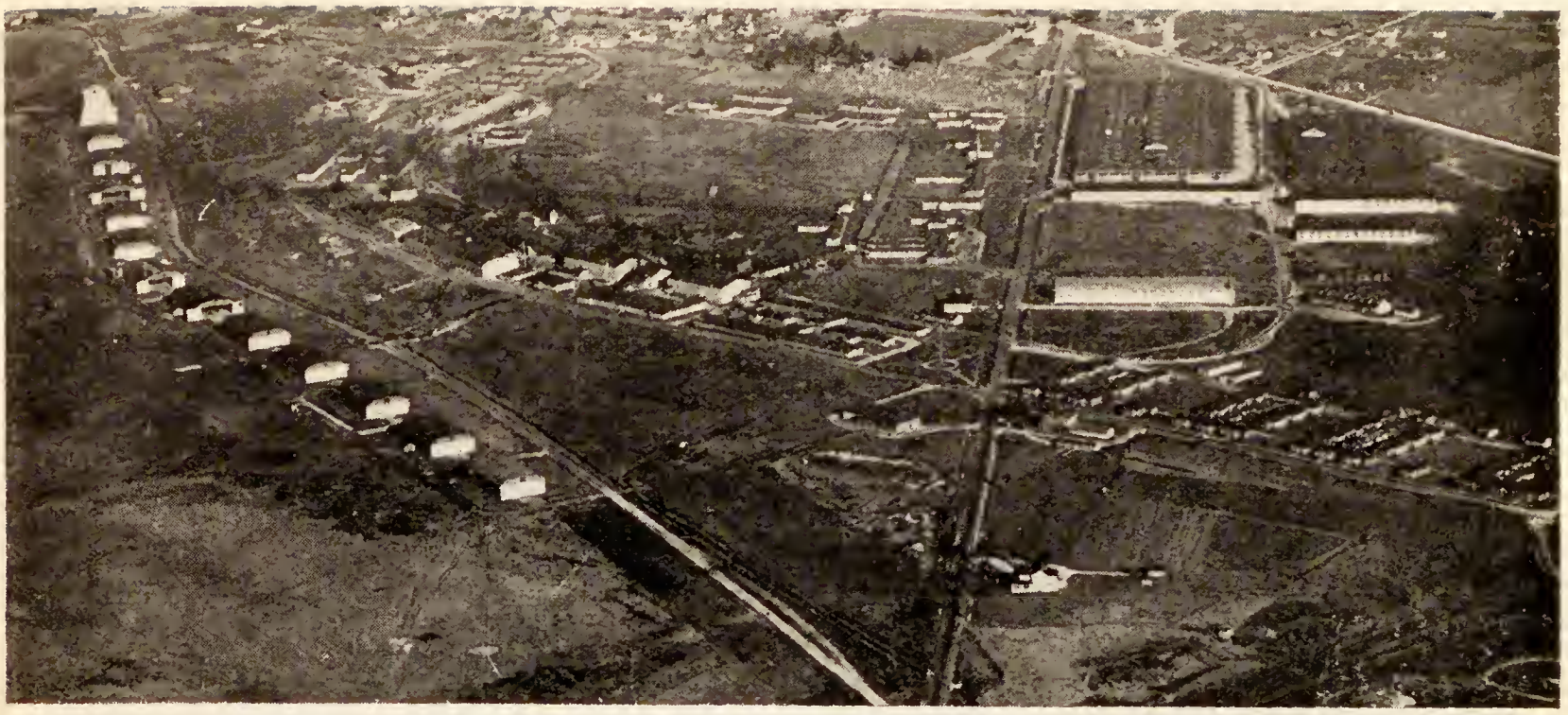
pointing out the things of interest many hundred feet below:

"While circling Wilbur Wright Field, the visitor chances a glance downward and is greeted with a bird's-eye view of the big station. With eyes fixed on the hangars and warehouses of the government supply depot maintained there, he watches them shrink into mere specks as the ship gains altitude and the pilot directs the course westwardly toward the city of Dayton. The outline of the field disappears and the scene grows into a vast expanse of agricultural lands of great fertility. It was this rich soil that attracted the early settlers to the territory in 1796. They built homes at the confluence of the four streams—now the city of Dayton.

"Looming up in the center of this beautiful landscape, like an Egyptian pyramid, stands one of the colossal flood dams; a part of the largest flood pre-

Down-town Dayton from the pedestrian's point of view.

Down-town Dayton from the fliers point of view.



Wilbur Wright Field, built during the World War and christened in honor of Wilbur Wright, who with his brother built and flew on the site the first successful airplane. The International Air Races are held on this field.

vention project in the world and one of the greatest engineering feats ever attempted in the United States.

"This dam together with four other dams of similar size, located on the principal streams in the vicinity of Dayton, form dry reservoirs capable of holding back a volume of water greater than that which caused the disastrous flood in 1913.

"In the direction of the ship's course, to the west, the city of Dayton comes into view. Its skyscrapers stand out in friendly greeting, clean-cut and clear. Winding through its center from northeast to southwest flows the Miami River with bridges like links holding the city together.

"Shutting off the engine, the pilot steers the ship toward the north end of the city and in gliding descent bears down upon another United States Government aviation field, known as McCook. The government aviation experimental laboratories are located at this field; the largest laboratories of their kind in the world. It is this aeronautical establishment that gives Dayton the distinction of being the center of aviation.

"The tremendous growth of aviation and the need for further development has made necessary the expansion of the experimental laboratories and landing field beyond the present topographical limits. Public spirited citizens of Dayton interested in the progress of aviation have purchased and presented to the United States Government an adequate site ideally located just east of the city limits between the present location and Wilbur Wright Field. The new field contains nearly five thousand acres and is valued at more than one million dollars. It is proposed that the prospective U. S. Air Academy, an institution similar to West Point and Annapolis, be placed on this ground.

"Between McCook Field and the Miami River is situated one of the city's foremost parks and bathing beach, Island Park. The dancing pavilion, tennis courts, bath house, canoe lockers, etc., are controlled by the city. The most popular of the tourists' camps is located in this park. Library, kitchens equipped with gas hot-plates and water, telephone and delivery service, electric light, police protection and bathing facilities are supplied the city's automobile guests. It ranks as one of the most complete and delightful parks in the country.

"A total of over a thousand acres of park and playground area is supervised by the city government, including the largest country club municipally owned in the world. This recreational retreat, the great playground of the citizens of Dayton, contains two hundred and ninety-four acres and is called Community Club. It maintains two eighteen, and one nine-hole golf courses, six tennis courts, dining, playground, and other facilities. The large wooded area of these grounds is left in a primitive state with many miles of bridle paths and automobile roads. Numerous log cabins distributed throughout this virgin wood, with fire places and cupboards filled with cooking utensils, are available to citizens who seek communion with nature.

"In a slow easy tilt the pilot banks in a turn toward the heart of the city and opens up the motor. But as he puts her nose into the air and begins to climb, following the course of the resplendent Miami River, the visitor becomes a hearty advocate of the modern mode of travel, without dust and without jar, as the city opens up in detail before him—a city of nearly two hundred thousand inhabitants and a thousand factories.

"Sailing south now toward the heart of the city, the aerial observer sees Dayton's forests of factory chimneys extending well out from the mercantile or down-town section, east to the corporation line and on the west as far as the vision carries. Dayton has long been recognized as one of the industrial centers of the country and is known as 'The City of a Thousand Factories,' turning out as great a diversity of products as any city of its size. Nearly a hundred of these products are world leaders, such as cash registers; farm lighting plants; automobile starting, lighting and ignition systems; computing

See Article on Page 64.

scales, etc. The value of factory output in 1923 is estimated at $237,343,000.

"Dayton is often spoken of as the 'Precision Center of America,' a term accurately applied in view of the close measurement and minute calculation required in the manufacture of many of the named products as well as hundreds of other articles of a mechanical nature produced in her factories.

"Industrial Dayton is noted not only for its world leading products, its thousand factories and precision work, but many of its plants are model industrial institutions, first in modern factory and distribution practice and in welfare work among their employees. The National Cash Register Company, one of Dayton's leading institutions converted an entire section of the city into one of the model residential districts of the country and has been a generous contributor to the beautifications and progress of the entire community. The trimming of lawns, the planting of shrubbery and flowers has been promoted to the complete elimination of any so-called slum district.

"As the visitor turns his gaze from the industrial areas to the north side of the river, he sees a representative residential section where homes were built to live in and are maintained as realms of happiness. Home ownership ranks high because everyone can buy a home through one of the eighteen building and loan associations the city supports. Approximately ninety percent of the new homes built are financed through these associations which have aggregate resources exceeding seventy million dollars. Their influence in the promotion of thrift and economy is evidenced by nearly one hundred and seventy-five thousand patrons in Dayton and vicinity. Homes are so easy to buy that the city has never been confronted with housing problems. It is popular and customary for a family to buy its home on terms as moderate as the usual rental fee.

"The contentment gained through the ownership of homes and desirable occupation has naturally been accompanied by increased educational facilities of high standard. The public school system comprises thirty-two schools with a total enrollment of 30,401 students, including over 4400 enrolled in the adult night classes. There are four high schools, a normal training school, and special schools, largely in the nature of pre-vocational, and classes for the deaf, defectives, cripples, sub-normal children and those with defective vision. There is one high school for freshmen, one for junior-senior and one for cooperative students. In addition there are nineteen parochial schools with 6,011 students, two theological seminaries, one university and the Moraine Park private school. Emblematic of the

The Air Traveller has no trouble in getting his bearings while flying over Dayton, Ohio. On the hangars at McCook Field are painted great white pointers marking the compass courses to all of the principal cities on the airways in a radius of 500 miles..

Community Club—The playground of Dayton citizens. This park area contains over a thousand acres which is supervised by the city government.

city's institutions of learning, Dayton's oldest high school stands out in bold dignity below the ship as she banks in a left turn upon leaving the course of the river.

"As impressive as was the river upon approaching the city, are the majestically wide streets, laid out in perfect blocks dividing the city's skyscrapers, from the view of the spectator as the ship flies south over the financial and commercial center. Notable edifices present themselves. A magnificent Engineers' Club stands as a monument to Dayton's engineering genius. Memorial Hall, with its red tile arched roof, a memorial to the Civil and Spanish-American War veterans, is the city's convention headquarters. The Public Library, the first established in the state, contains 135,000 volumes. The old Court House, a model of Greek architecture, stands like a sentinel commanding attention. The Federal Building is a specimen of modern art.

"Occupying equally dominating positions are the many spires of Dayton's one hundred and thirty-eight churches. Mercantile and commercial establishments and banking institutions complete the city's sky line of structures.

"The five national and three state banks have total deposits aggregating more than $46,522,941. Included in the state banks are two trust companies with six branches. Bank debits in 1923 were $833,005,713.96 compared with $674,371,259.58 in 1922; an increase of $158,634,454.38.

"Emphasized by an artistic Italian model depot, the main artery of trade becomes visible crossing the city parallel with the river, connecting the two industrial divisions, as the ship descends slightly upon leaving the central part of the city. The roads serving the city are the Baltimore & Ohio; Big Four; Cincinnati, Lebanon & Northern; Dayton & Union; Erie and Pennsylvania. Interurban, bus, and motor freight truck lines extending in every direction afford splendid facilities for reaching the several hundred thousand persons residing within the trade radius.

"Soaring skyward again to the dizzy height of the clouds, the pilot shuts off the engine for a noiseless glide to a distance of four miles south of the city. Having become acclimated to the conquest of the air, the visitor adjusts his position in the cushioned chair and lights a cigar as the ship passes over the very home of the pioneers of the air nestled down in a clump of trees in the Village of Oakwood, a suburb of Dayton. The suburban estate of the late John H. Patterson and the homes of many other celebrities lie in this delightful spot surrounded by all the attractions of nature. As Mother Earth comes up to meet the descending ship, the landing is made with all the ease of stopping a motor car. In ten minutes the visitor motors back to the city—Dayton—the Nation's Air Center."

A birdseye view of the city of Dayton looking eastward from an elevation in Dayton View.

—AMERICA—
THE BEAUTIFUL, FROM THE AIR

UPON the following pages are to be seen some of the most remarkable photographs of scenic beauty that have ever been printed. They represent something unique, and rare since they were made possible only through the fearlessness and daring of Uncle Sam's two noted airmen, Lieutenants John A. Macready and A. W. Stevens of McCook Field, Dayton, Ohio.

These two birdmen recently completed a photographic survey of America from the air. Most spectacular of these expeditions being the tours of the Western National Parks which undertaking was O. K'ed by the Chief of Air Service subsequent to a return flight from the western coast where the aviators had been sent on a mission to photograph the eclipse of the sun from the air.

All in all, in the course of eight weeks flying the airmen covered 10,000 miles and made 2,000 photographs.

"ABOVE THE THREE MILE LIMIT"

Lieutenants A. W. Stevens and John A. Macready drinking "refreshments" after hazardous photographing flight over rugged western mountains.

Many of these beautiful photographs ranging from views of our greatest cities, our leading institutions, our majestic waterfalls, the Reelfoot Lake earthquake district of Tennessee, together with first hand stories were published in current issues of Slipstream.

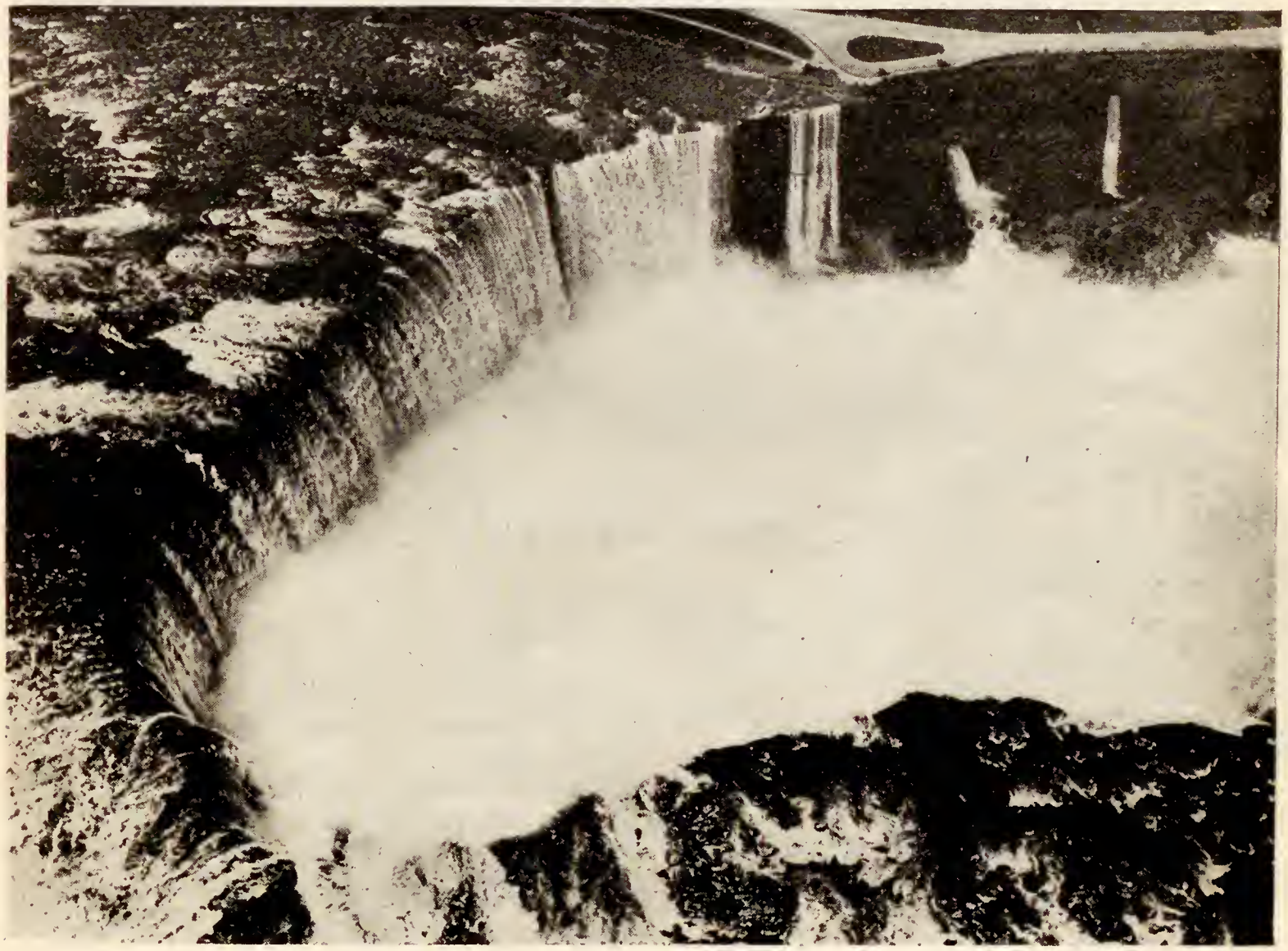
Lieutenant Macready, a graduate of Leland Stanford Jr. University, is a well known personage in America. His non-stop flight across America with his co-pilot Lieutenant Oakley G. Kelly, together with his altitude flights and other air exploits are common gossip, both in and out of air circles. When the World War broke out Lieutenant Macready left his home in the little desert town of Searchlight, Nevada, for San Francisco expecting to enlist in the U. S. Cavalry. As justice of the peace of the little settlement among the sagebrush Macready spent much time in the saddle and it was a strange play of fortune, as explained by the noted pilot, which induced him to enlist as a private in the aviation section of the Signal Corps.

Lieutenant Stevens, a graduate in electrical engineering from the University of Maine, had his training for the arduous life of an aviator as a mining engineer. With broad, massive shoulders, long sinewy arms and giant frame, he looks for all like the hardy pioneer which life he first sought "mushing" his way by dog team twice across Alaska in quest of placer gold. As a photographer Lieutenant Stevens is considered a genius and his photographic files show the strong inclination for the things of natural grandeur—the hidden nooks and crannies of the globe unspoiled by the onrush of civilization.

During the Western Park expedition the two aviators took 1700 aerial views, finishing up with Yellowstone Park. In the collection are views of Mount Adams, Mount Hood, Mount Jefferson, Mount Washington, The Three Sisters, Mt. Theilson and Crater Lake, Mount Shasta, Mount Lassen, the only active volcano in the United States, Yosemite Park, including the Huge Half Dome, El Capitan, Yosemite Falls, and Vernal Falls; Sequoia National Park; Mount Whitney, the highest mountain in the United States; Death Valley; Mount Charleston in southern Nevada; the Grand Canyon of Arizona; the region of the Cliff Dwellers, and the Painted Desert of Arizona.

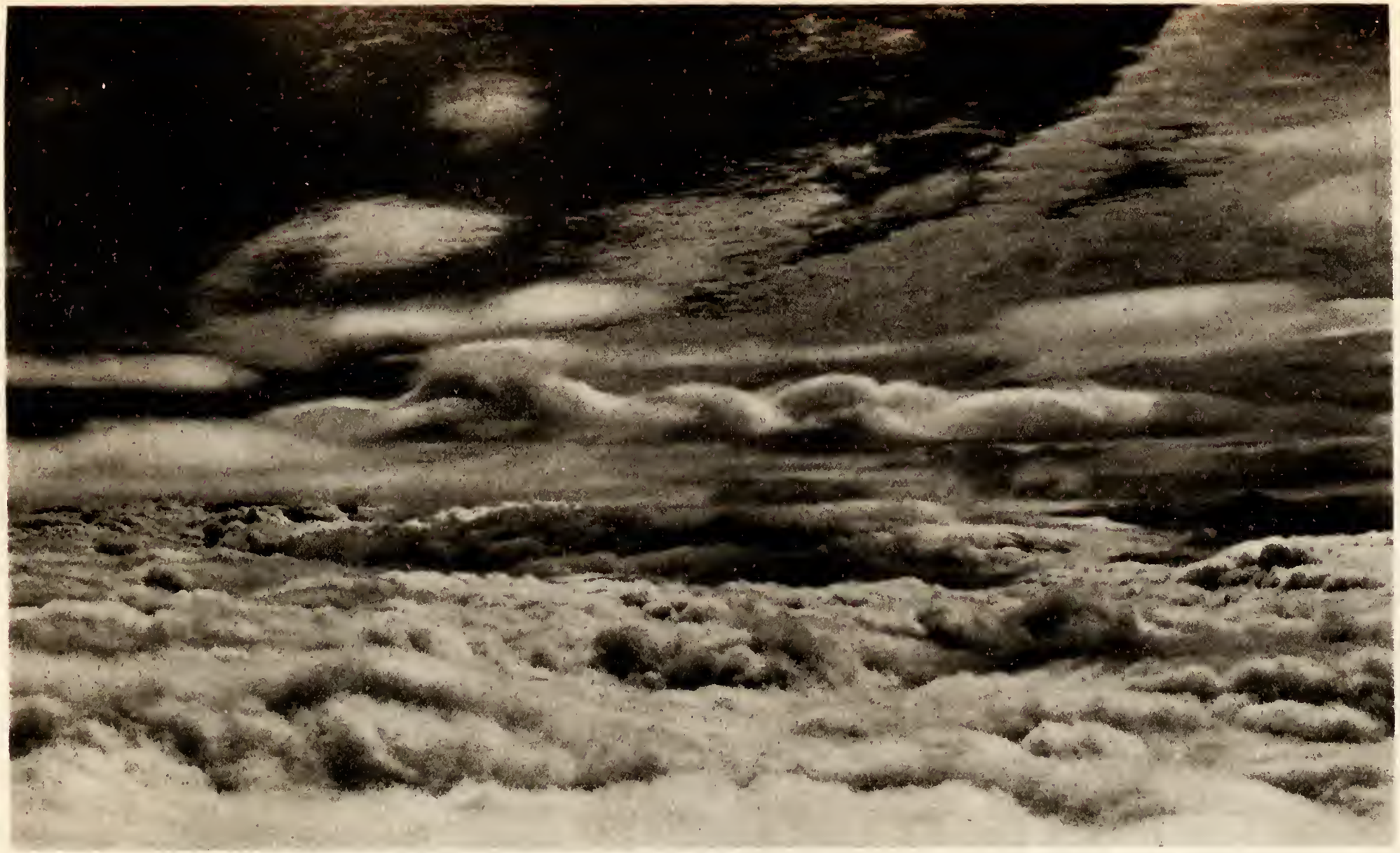
Lieutenant Stevens is now in the unexplored regions of the Amazon River, with the Dr. Alexander Hamilton Rice expedition, where they will make an aerial survey of the inaccessible jungles.

A large steel boat will be used for an operating base with two flying boats provided for the aerial work. Doctor Rice has spent twenty years exploring the upper part of Brazil and has explored 500,000 square miles of this territory.



THE GREAT NIAGARA AS SEEN FROM THE AIR

These beautiful and unusual views of the great Niagara reproduced so delightfully by the aerial camera enhance our lure for air travel and awakens even the conservative mind to visual dreams of what the next generation bids fair to enjoy. Indeed, the present generation can view these wonders as the Johnson Flying Service, Inc., of Buffalo, takes passengers over the falls at a reasonable figure.



Lonely it makes me feel,
High up here in the air,
Close up under the sun,
With never a cloud above
And only the clouds below.
Never a sight of the earth,
Never a mark for my eyes
As guide to the hangars of home.
Only a rainbow that glows
There in the heart of the cloud
Where the propeller came through.
Only that, and the clouds,
Billow on billow away.

Billows that tumble and roll,
Towers that crumble and fall,
Meadows that mingle and meet,
Mountains that melt and are gone
Drifting to snow banks away,
Soft as the oceans of sleep.
But never a mark that I know
As guide to the hangars of home.
Only the sun overhead,
Only the infinite blue,
Only the clouds and the bow,
Only the silence that sings.

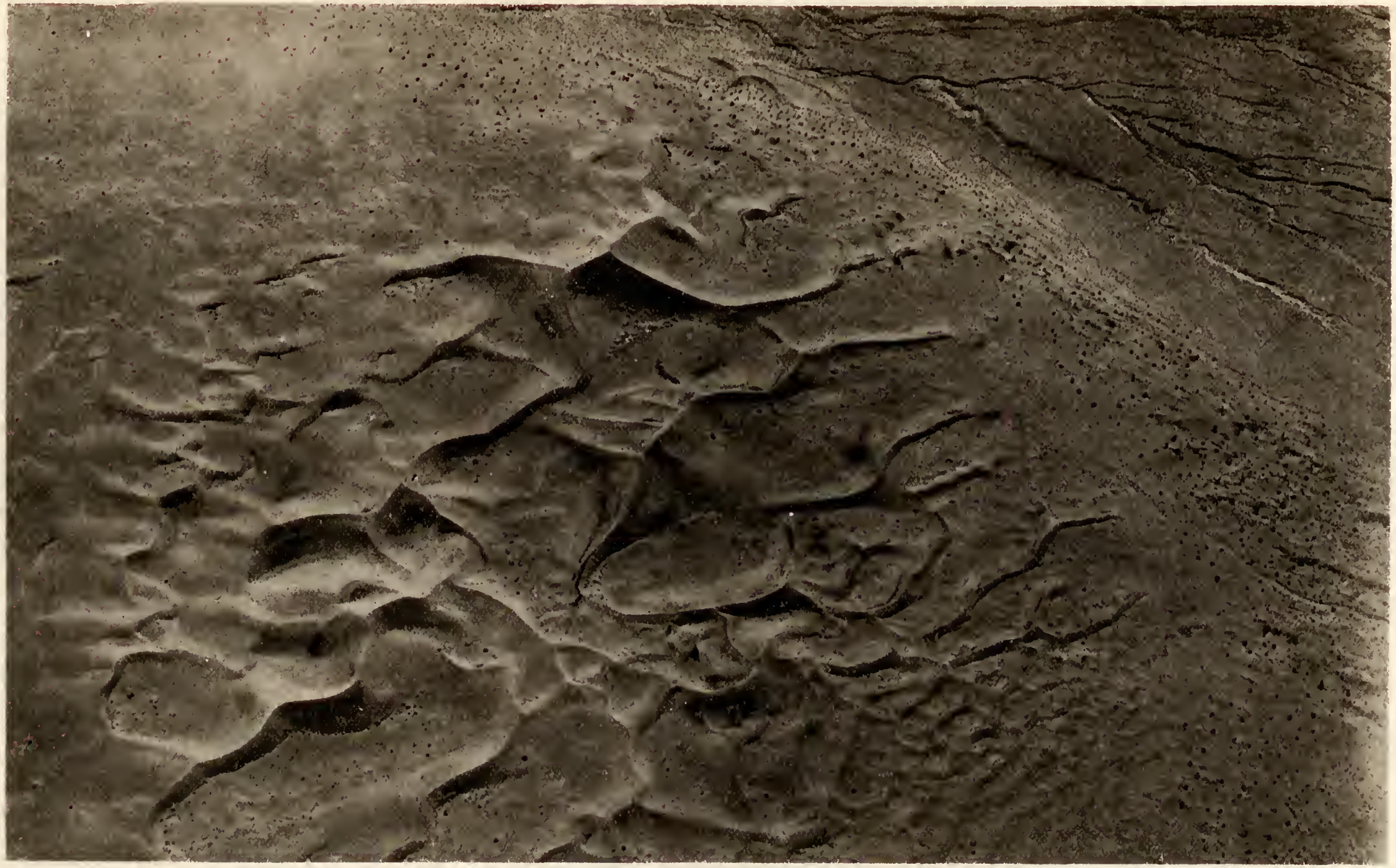
Stars shall come after awhile,
For here in His firmament, here,
That showeth His handiwork plain,
That maketh His mystery clear,
That showeth the pathway to Him.
And then I shall steer by His stars,
Forgetting the hangars of home,
And follow the light that He sends,
And soar through the silence to God.

—ALLEN CLARK.

Special Permission National Geographic Magazine

VIEWED FROM AN AIRPLANE, YOSEMITE FALLS DWINDLES TO A SPARKLING RIBBON

The appearance of America's highest waterfall is very different in June, when the volume is great and every gust of wind wafts clouds of spray along the rocky hillsides. The Upper Fall alone is nine Niagaras high, the Lower Fall is 320 feet, and the total drop from crest to river, including intervening cascades, is nearly half a mile. The dark markings on the face of the cliff gives an idea of the spread of the falls during the high-water season. To the extreme right can be seen the scar worn by a more ancient falls—the beauties of which were present only for the primitive races to worship and enjoy.



AN AMERICAN SAHARA FROM THE AIR

Special Permission, National Geopraphic Society

Huge sand dunes in the floor of the Death Valley, California, are formed, reformed, and ever change, because of the air currents that sweep in from the adjoining canyons. Sometimes these dunes are 200 feet high. Looking down upon the valley floor, the aviator can see a dozen or more whirl winds, denoted by the clouds of sand. "Death Valley from the air does not differ in appearance from valleys immediately adjoining it on either side. It is, however, considerably lower. Most of it is about sea level but near the center, over which we passed, there is a sink that is depressed 271 feet below the sea, and is the lowest point of dry land in the United States. Just to the north of the sink, Furnace Creek enters the valley from Funeral Range on the east, but except for the brief periods immediately following heavy rains, which are extremely rare, there are no signs of water in sink or creek."

—Stevens and Macready.

There will be added profit in your visit to Dayton

—if you take home some needed article of clothing from The Metropolitan Co.

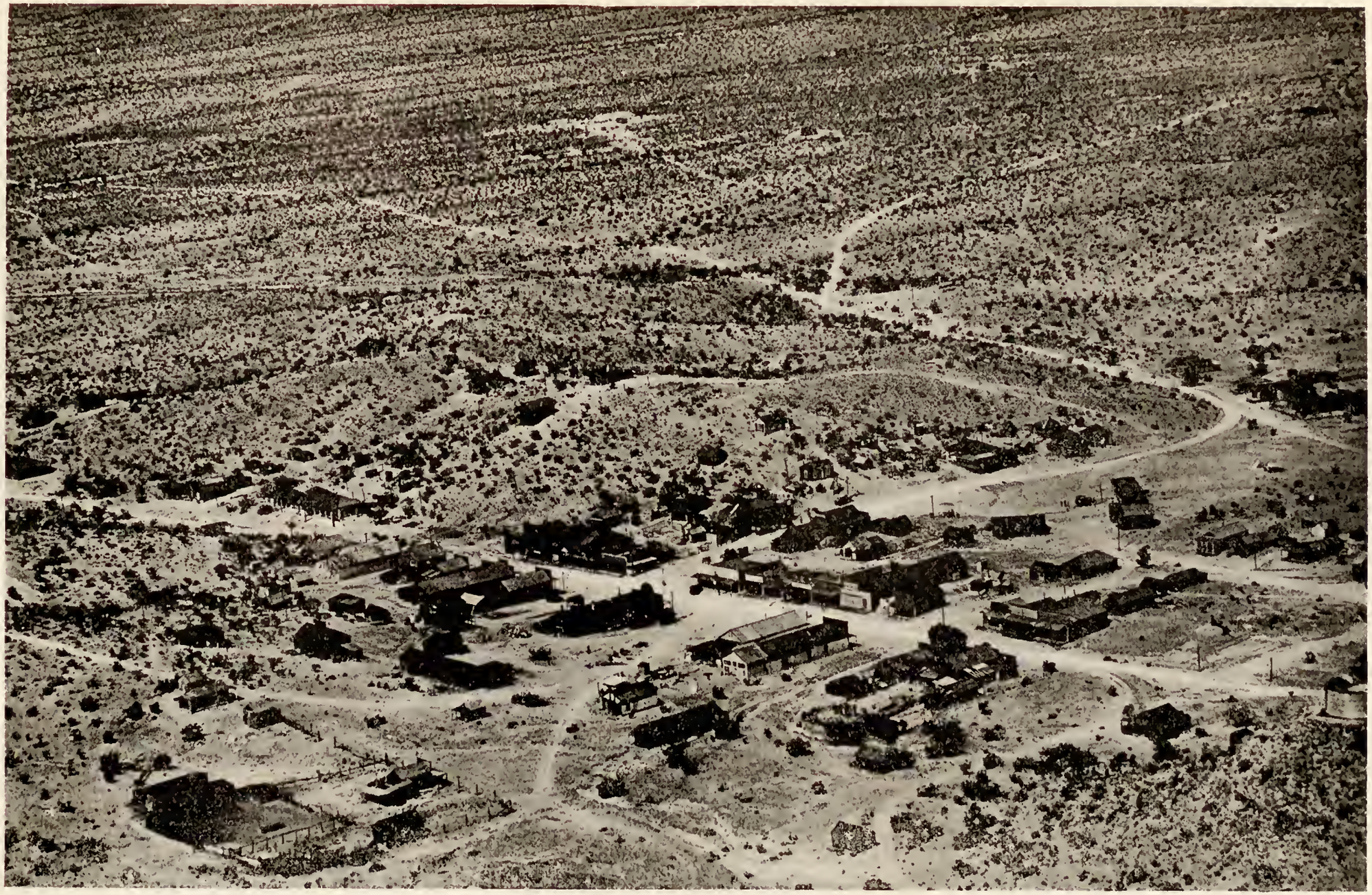
SITUATED on Ludlow at Fourth, in the heart of Dayton, this big store with its long stretch of brightly lighted window displays, is a sight well worth seeing.

WE would be pleased to have you visit us.

The Metropolitan Co.

Ohio's Greatest Clothiers for Men and Boys

LUDLOW AT FOURTH



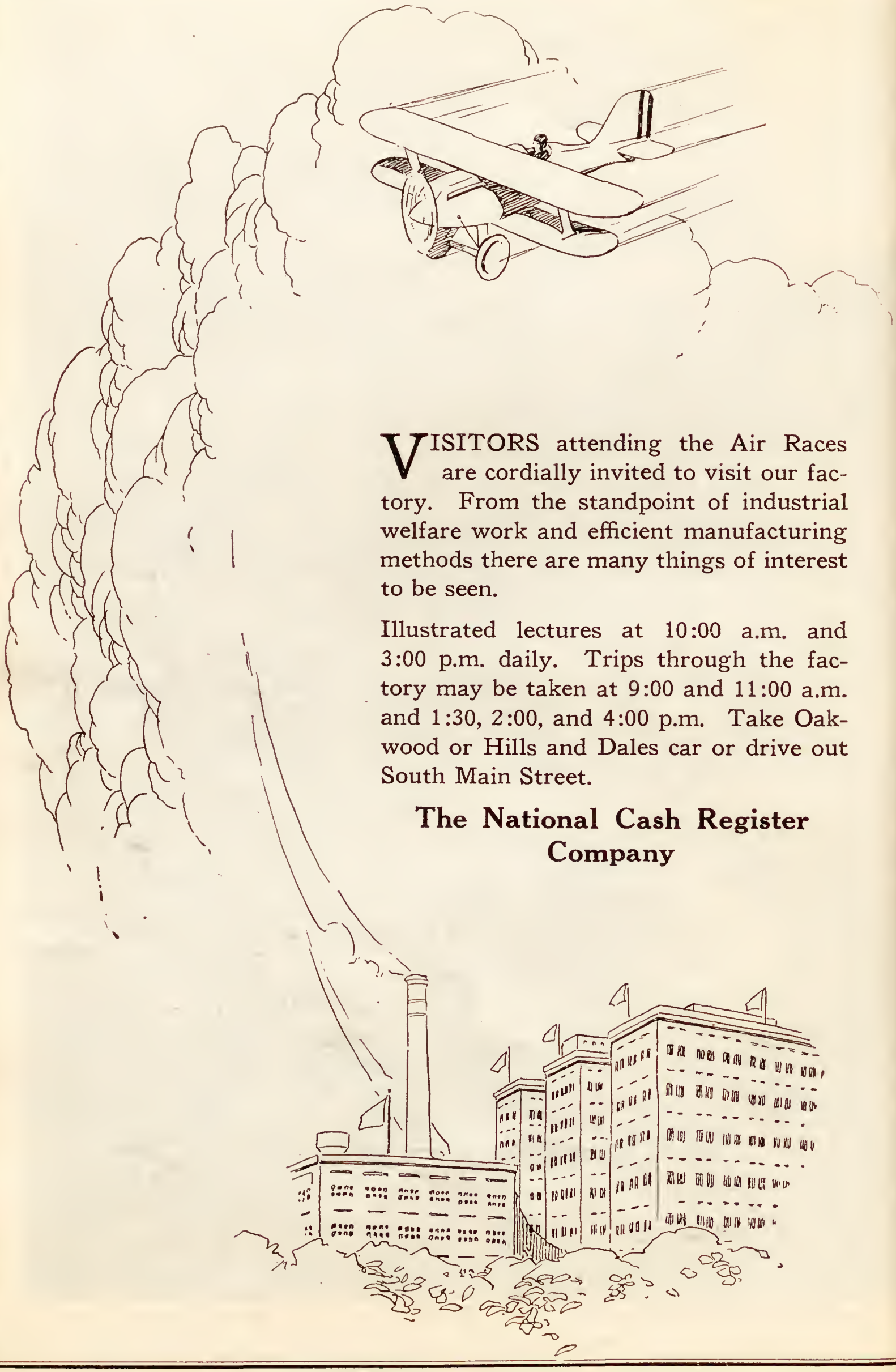
By Special Permission, National Geographic Magazine

A VIEW OF THE MINING TOWN OF SEARCHLIGHT, NEVADA, SURROUNDED BY SAGEBRUSH AND DESERT

While flying over the Western territory Lieutenant Macready requested his co-pilot, Lieutenant Stevens to snap a picture of his old home town where he once presided as justice of the peace before he enlisted as an aviator in the Signal Corps.

WHERE CLOUDS ARE BORN—THE THREE TETONS *Official Photo, U. S. Air Service*

Like great fluffy rolls of cotton these clouds boil up from the Idaho side to the west to be deposited later as snow on the lofty Teton peaks and as rain in the valleys of Yellowstone Park, Wyoming.



VISITORS attending the Air Races are cordially invited to visit our factory. From the standpoint of industrial welfare work and efficient manufacturing methods there are many things of interest to be seen.

Illustrated lectures at 10:00 a.m. and 3:00 p.m. daily. Trips through the factory may be taken at 9:00 and 11:00 a.m. and 1:30, 2:00, and 4:00 p.m. Take Oakwood or Hills and Dales car or drive out South Main Street.

The National Cash Register Company

HIDDEN VALLEYS WHERE SUNBEAMS MAKE BUT BRIEF VISITS *Official Photo U. S. Air Service*

Hemmed in by sheer walls, these secluded valleys have but a few hours of sunshine during the midday. Landing fields for airplanes are indeed at a premium in this region of the Tetons.

"WACO" HAS READY SALE

PROMINENT among the several rising Commercial Aircraft manufacturing concerns of the middle west is the Advance Airplane Company of Troy, Ohio, fifteen miles north of the site of the 1924 International Air Races, on the airway between Dayton and Detroit.

Clayton J. Brukner and Elwood J. Junkin, who comprise the members of the firm have engaged in aircraft design and operation for the last ten years although the present company was organized since the World War.

In conducting its business the Advance Aircraft Company has accepted conditions as they now stand in the aeronautical industry. Without pretension or over-enthusiasm they have built up an enterprise with modest methods.

In perfecting the WACO they have attempted to incorporate every practical feature most needed in a passenger carrying or commercial ship. Its short take-off and rapid climb, although using only a 90 horse power motor is an unexcelled feature of the WACO.

The WACO can be flown at a speed of less than 30 miles per hour as demonstrated recently over the speed course at Wilbur Wright Field. This makes it possible for a novice to handle the ship within a very few hours.

The Advance Airplane Company has turned ou ships for carrying as high as eight passengers, bu the three-passenger job, always the most practica and reliable for ordinary use is the standard desig The cockpits are roomy and neatly upholstered i black chase leather. The broad sidewalks mak access to the passengers' compartment quite eas The cockpit interiors are finished with mahoga dashboards, seats, and floors.

Without a force of salesmen the Advance Air plane Company have actually found a ready sal for their ships as fast as they were turned out dur ing the past year.

For 1925 Messrs. Brukner and Junkin announc that they will have to offer even a more advance design of the WACO, which with greater utilit and a price within reach of anyone of ordinar means should prove a popular seller on the growin market.

Visitors to the Air Races who contemplate pur chasing an airplane either for their private use o for passenger-carrying should avail themselves o the opportunity and visit the Advance Airplan Company just a short driving distance north o Dayton at Troy, Ohio.

THE BARLING BOMBER

Largest Airplane in the World

Walter H. Barling

THE BARLING BOMBER

BEHOLD! The Barling Bomber—the most mighty of all heavier-than-air flying machines; weight 40,000 lbs., height 28 feet, overall length 65 feet and a wing spread of 120 feet.

This huge ship is driven by six 12-cylinder, 400 h. p. Liberty motors and requires a crew of eight men to handle it while on a war-time cruise of destruction. It could carry bombs of various sizes totaling more than four tons weight, from Dayton to New York, destroy the city and return to its base all in one night. It could pick up eight tons of coal at Scranton, Pennsylvania, and deliver it in six hours to a cellar in Chicago.

The Barling Bomber made its maiden flight Wednesday, August 23, 1923, at Wilbur Wright Field before several thousand spectators. Lieutenants H. R. Harris and M. E. Fairchild piloted the ship with Douglas Culver acting as engineer. Walter H. Barling, the designer of the plane, was also carried as a passenger.

Since this initial flight the Barling Bomber has made many notable flights to distant points. It flew to the International Air Races at St. Louis last year where it remained upon exhibition during the event and aroused both awe and enthusiastic comment from the many thousands of visitors who viewed it.

So large is this monster of the air that it was necessary to assemble the parts under rude temporary shelters and after the ship was put together no hangar was found big enough to house it. From standing in the open elements it was deemed advisable in the spring of 1924 to completely overhaul and refit the ship from "tip to toe." A large specially built hangar is now provided at Wilbur Wright Field to shelter the ship.

The Barling Bomber was designed by Walter H. Barling, a native Englishman, and built by the Witteman Aircraft Corporation for the U. S. Army Air Service.

The ship holds the following world records:

DURATION: Class C Plane—With useful loads of 500 kilograms (1102 lbs.), 1000 kilograms (2204 lbs.), 1500 kilograms (3306 lbs.), 2000 kilograms (4408 lbs.) and 3000 kilograms (6612 lbs.): Lieut. H. R. Harris, Wilbur Wright Field, October 27, 1923—1 hr. 19 min. 11.8 sec.

ALTITUDE: Class C Plane—With useful loads of 1500 and 2000 kilograms—2049 meters (6722 feet): Pilot H. R. Harris, Wilbur Wright Field, October 25, 1923. With useful load of 3000 kilograms—1629 meters (5344 feet): Pilot Lieut. H. R. Harris, Wilbur Wright Field, October 27, 1923.

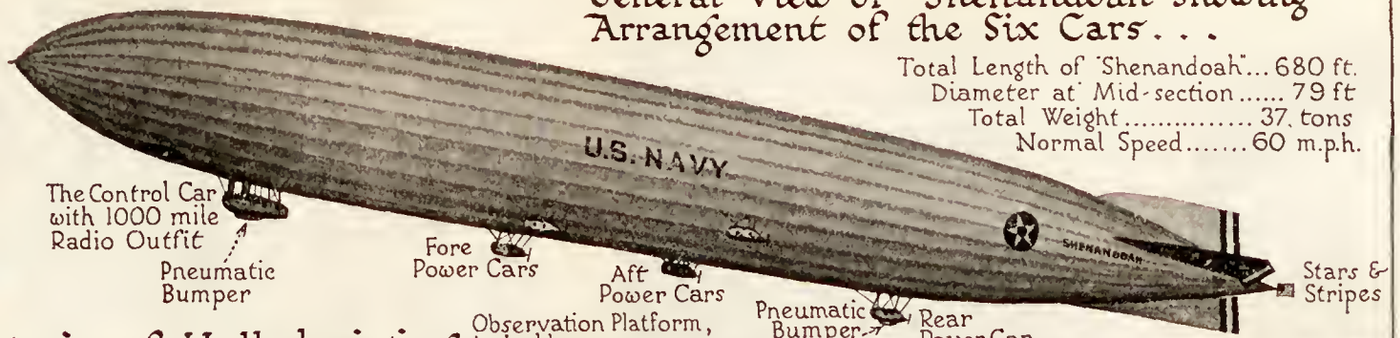
Head-on View...

The Cars arranged thus to avoid the Air Wash between the Propellers

Each Power Car has a 300 H.P. Packard Motor

General View of "Shenandoah" showing Arrangement of the Six Cars...

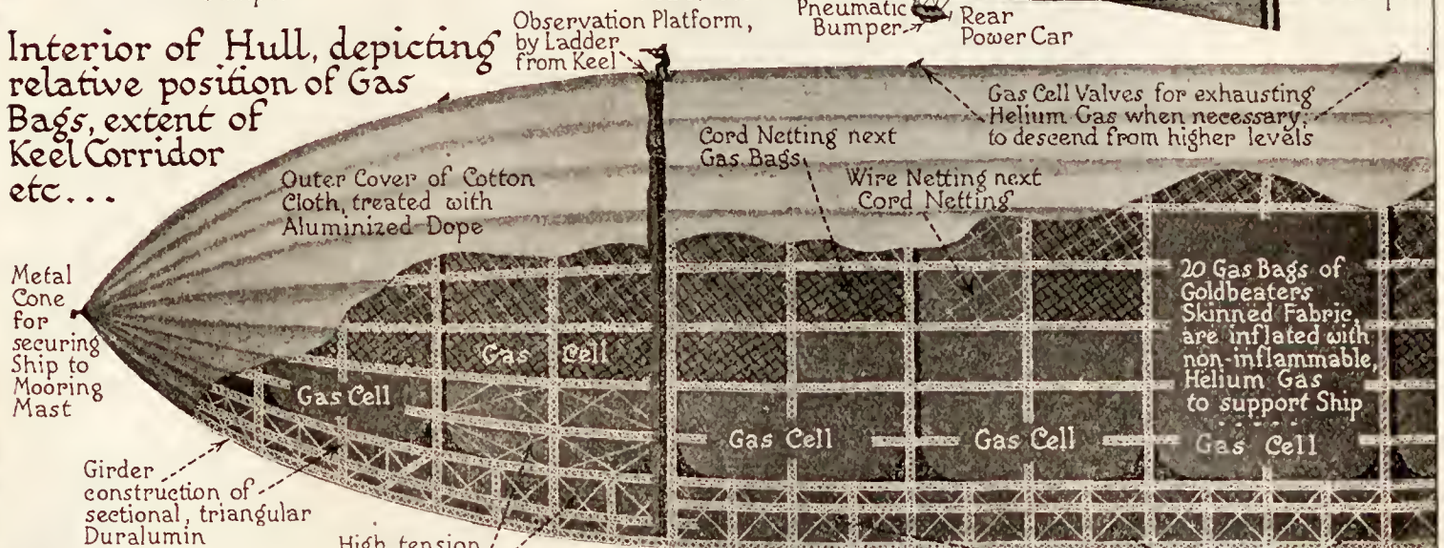
Total Length of "Shenandoah"... 680 ft.
Diameter at Mid-section..... 79 ft
Total Weight..... 37. tons
Normal Speed..... 60 m.p.h.



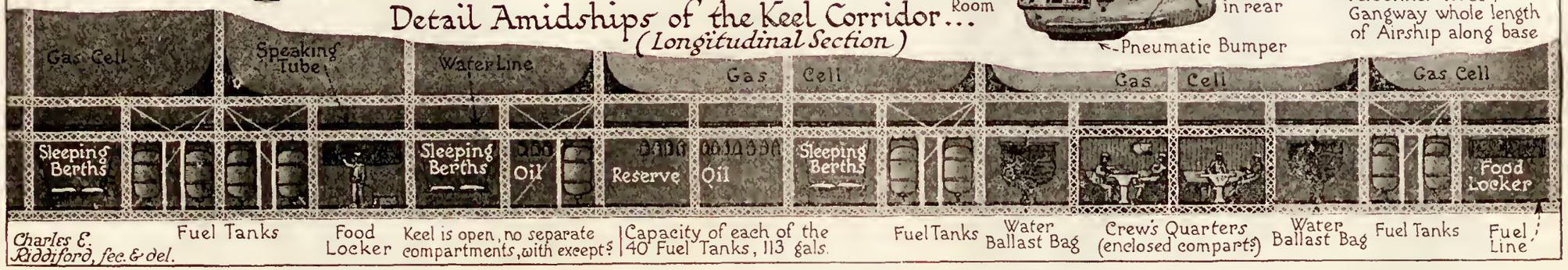
The Control Car with 1000 mile Radio Outfit
Pneumatic Bumper
Fore Power Cars
Aft Power Cars
Pneumatic Bumper
Rear Power Car
Stars & Stripes

View Astern to illustrate Steering Mechanism..

Interior of Hull, depicting relative position of Gas Bags, extent of Keel Corridor etc...



Detail Amidships of the Keel Corridor...
(Longitudinal Section)



Charles E. Riddiford, fec. & del.

Fuel Tanks | Food Locker | Keel is open, no separate compartments, with exceptⁿ | Capacity of each of the 40 Fuel Tanks, 113 gals. | Fuel Tanks | Water Ballast Bag | Crew's Quarters (enclosed compartⁿ) | Water Ballast Bag | Fuel Tanks | Fuel Line

By Special Permission, National Geographic Magazine

CROSS—SECTION AND END—ON DIAGRAMS OF THE "SHENANDOAH"

The silvery appearance of the Shenandoah's hull, especially notable the night it floated in stately dignity over Dayton, Ohio, with the searchlights at McCook Field cutting its cameo outlines against a dark sky, is due to an aluminum powder paint applied to cotton cover fabric to reflect the sun's rays. This paint was not used for esthetic reasons, but to avoid overheating of the gas bag. A black pigment is spread upon the inside of the cover. Goldbeater's skin, tissue from the intestines of oxen, is used for lining the huge gas bags. Stockyards saved the membrane from some two million cattle for the Shenandoah and the sister ship ZR-3 soon to be flown from Germany to America.

UNCLE SAM'S BIG AERIAL SISTERS

The Shenandoah and ZR-3

U. S. Navy Owns Two Largest Zeppelins Ever Built

AT LAKEHURST, New Jersey, U. S. Naval Station, stands the largest single room structure in the world—962 feet long, 348 feet wide, and 200 feet high. This is the domicile of Uncle Sam's two monster sisters of the air—the Shenandoah and ZR-3.

Both the Shenandoah and ZR-3 are modeled after the most successful German Zeppelins, the former designed for scouting and bombing duty with the Navy, the latter being the "last word" in the popular conception of the aerial pullman.

Construction on the Shenandoah was begun in 1920. The maiden flight was made from Lakehurst, September 4, 1923, marking the first time in history a rigid airship has been flown when inflated with helium—a non-inflammable gas. On September 11, she made a flight over the eastern states of New York, New Jersey and Pennsylvania, consuming 12 hours. Again on October 1 she set out on an extended journey from Lakehurst to the International Air Races at St. Louis, passing through Pennsylvania, Ohio, northern section of Kentucky, Indiana, and Illinois. Stopping a short while at St. Louis she proceeded northward to Chicago and returned to its base via Toledo and Cleveland after being in the air 47 hours 49 minutes and covering a distance of 2200 miles.

On January 16, 1924, the Shenandoah was ripped from her mooring mast and driven before a terrible gale for many hours in total darkness. After fighting the storm throughout the night the big ship, badly damaged was brought back safely at dawn to her hangar by the few men on board.

The Shenandoah is 680 feet long, her sister, the ZR-3, is 660 feet. She has a maximum speed of 80 m. p. h. with all six of her Packard 350 h. p. engines running. Her cruising radius is 4500 miles, consuming in this distance almost 5,000 gallons of fuel carried in tanks located along her central keel. Her dead weight of structure is 74,360 pounds—total lift of her helium-filled gas cells 103,000 pounds. The Shenandoah carries a crew of 42 men.

Contrasting the features of the Shenandoah the ZR-3 is luxurious and completely equipped for passenger accommodation. She has been built entirely by the German Zeppelin Co. at Friedrichshafen, representing one of the World War "reparation" items and will be delivered by a German crew, who will fly it across the Atlantic to the Lakehurst station.

The ZR-3 has six cars, five of which contain a 400 h. p. Maybach engine while the sixth and most forward, forms the control and passengers' car. There are five separate compartments, each seating five passengers comfortably. Large windows give excellent views below. These compartments are luxuriously fitted, Pullman fashion, each containing four beds. Lavatory and kitchen are located to the port side.

Accommodation for officers and crew is located along the sides of the corridor, and consists of a cabin for the commander with bed, table, chairs, cupboard, etc.; two sleeping cabins, each with two beds for officers; six sleeping cabins each with two beds for the crew, two saloons, with tables and chairs for the crew; and lavatory. Cargo, baggage and mail are carried in the corridors, twenty compartments for this purpose being provided.

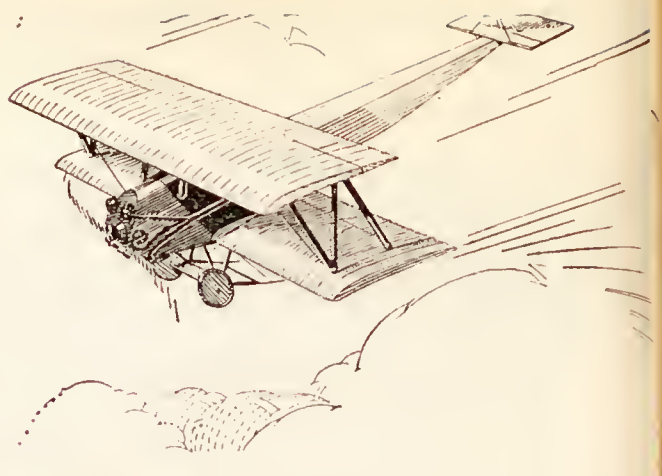
The Germans will use Hydrogen gas when they fly the ship on its 5200 mile trip across the Atlantic via the Azores. Upon the completion of the delivery to the U. S. Navy, helium gas will be placed in the big ship.

The ZR-3 awakens one to the commercial possibilities of the great airship operating on such a regular airline as a route from San Francisco to Honolulu. This 2300 mile journey takes a steamer about five days. Under good weather conditions the ZR-3 could make the trip in a little more than 28 hours and the return flight to San Francisco in about 36 hours. On such a trip the ZR-3 could carry 30 passengers and 15 tons of freight.

By Special Permission, National Geographic Magazine

THE MOORING MAST MAKES THE AIRSHIP PRACTICAL

The chief difficulty of flying the giant Shenandoah at first was getting her in and out of her hangar, an operation which required more than 300 men, and there was always danger of damage. "What will she do at a mast in case of a storm?" is the layman's first question. "Exactly what she would do were she flying," her crew will reply, "cut loose and ride around it." This was what the ship did of her own accord on her wild night ride of last January.



The Sport Farman is Valsparred

FOR business, commuting or pleasure—there's no plane like the Sport Farman.

Light in weight, sturdy in construction, and with an abundance of power—the Sport Farman has a remarkable speed range and an unusually low landing speed. And the accuracy and ease with which it can be controlled make it ideal for the amateur aviator.

Mr. C. T. Ludington, President of the Ludington Exhibition Co., writes, "the wing surfaces of our planes are finished with French dope which is satisfactory except that it allows the fabric to loosen up badly in wet weather. To overcome this difficulty we give the wings two coats of Valspar, and the result is a beautiful, shiny surface which stays taut, in spite of days of heavy rain. Best of all, it materially improves the speed and climb of the plane, due, no doubt, to the splendidly taut, smooth wing surfaces for which Valspar is responsible."

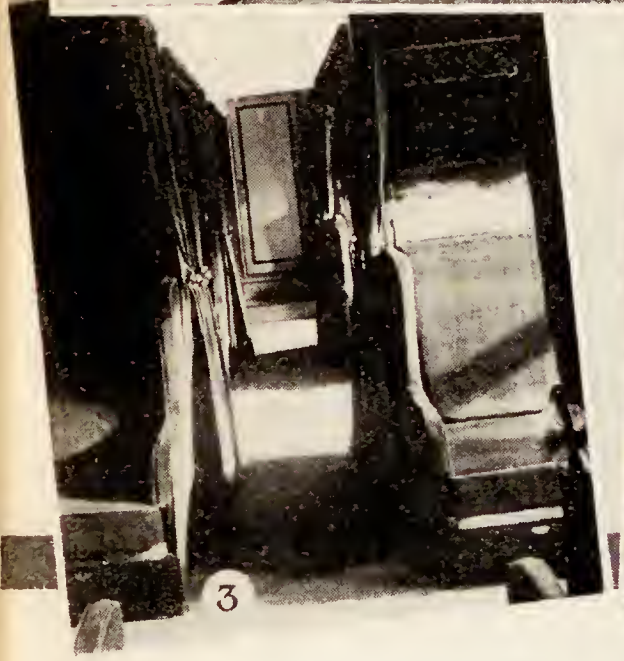
Every new test merely serves to emphasize Valspar's supremacy. It is waterproof and weather-proof, unequalled in toughness, marvelous in elasticity. Today Valspar is used wherever airplanes take the air.

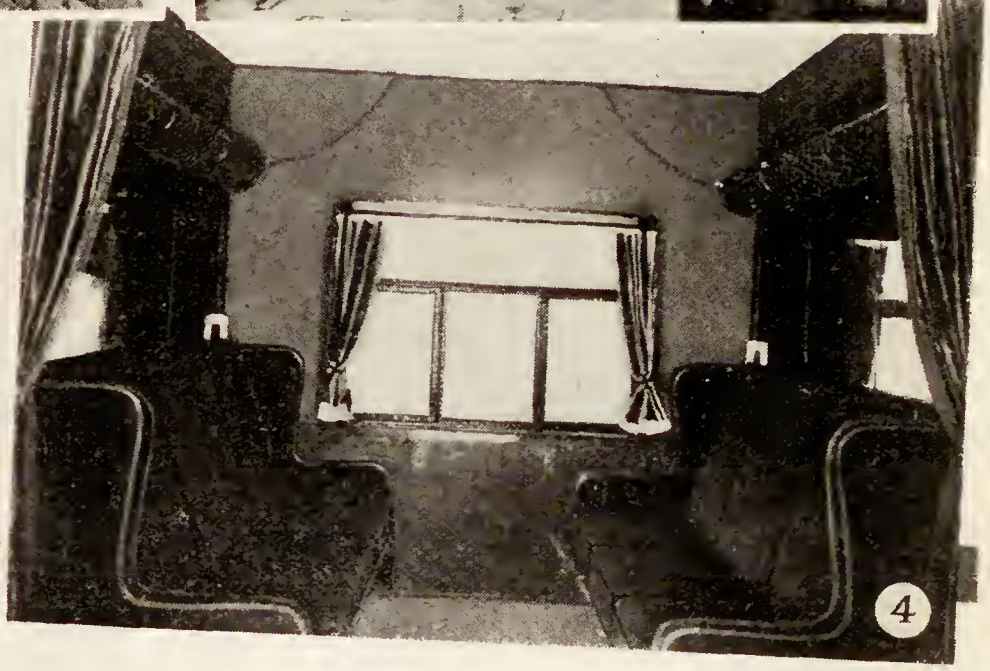
VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

VALENTINE & COMPANY

Largest Manufacturers of High-Grade Varnishes in the World—Established 1832

New York Chicago Boston W. P. FULLER & CO., Pacific Coast
Toronto London Paris Amsterdam

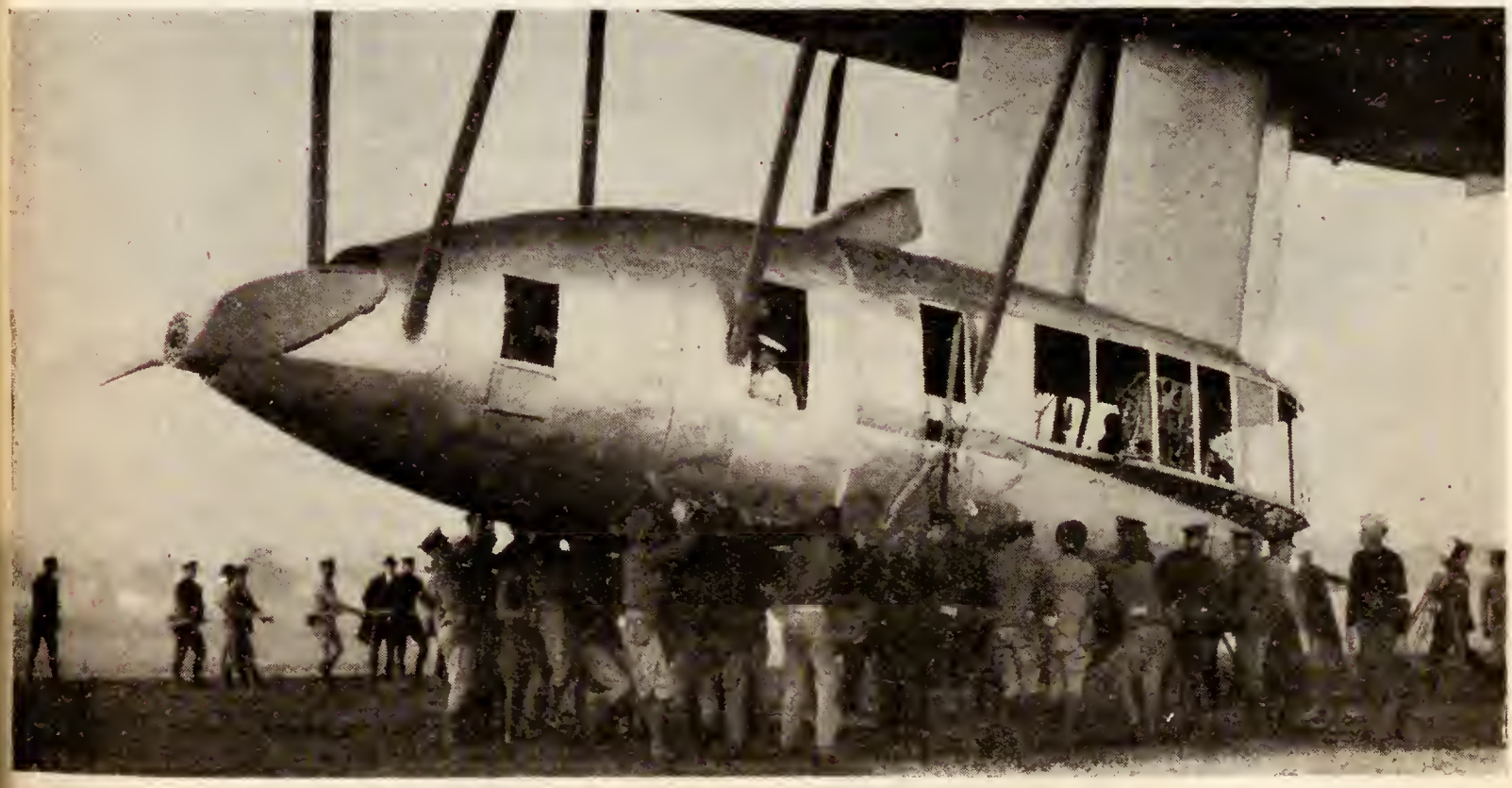




—*World Wide Photo*

INTERIOR VIEWS OF AMERICA'S NEW ZEPPELIN—THE ZR-3

(1) A Section of the Officers' quarters. (2) Doctor Eckener, President of the Zeppelin Company and Doctor Durr, Managing Director of this well known firm which will deliver to the U. S. Navy the new ship ZR-3. (3) The Passenger cabin, more pretentious and roomy than the modern Pullman Car. (4) Another view of the Passenger cabin showing the roomy plushed seats and comfy, substantial-looking interior of the huge aerial monster.

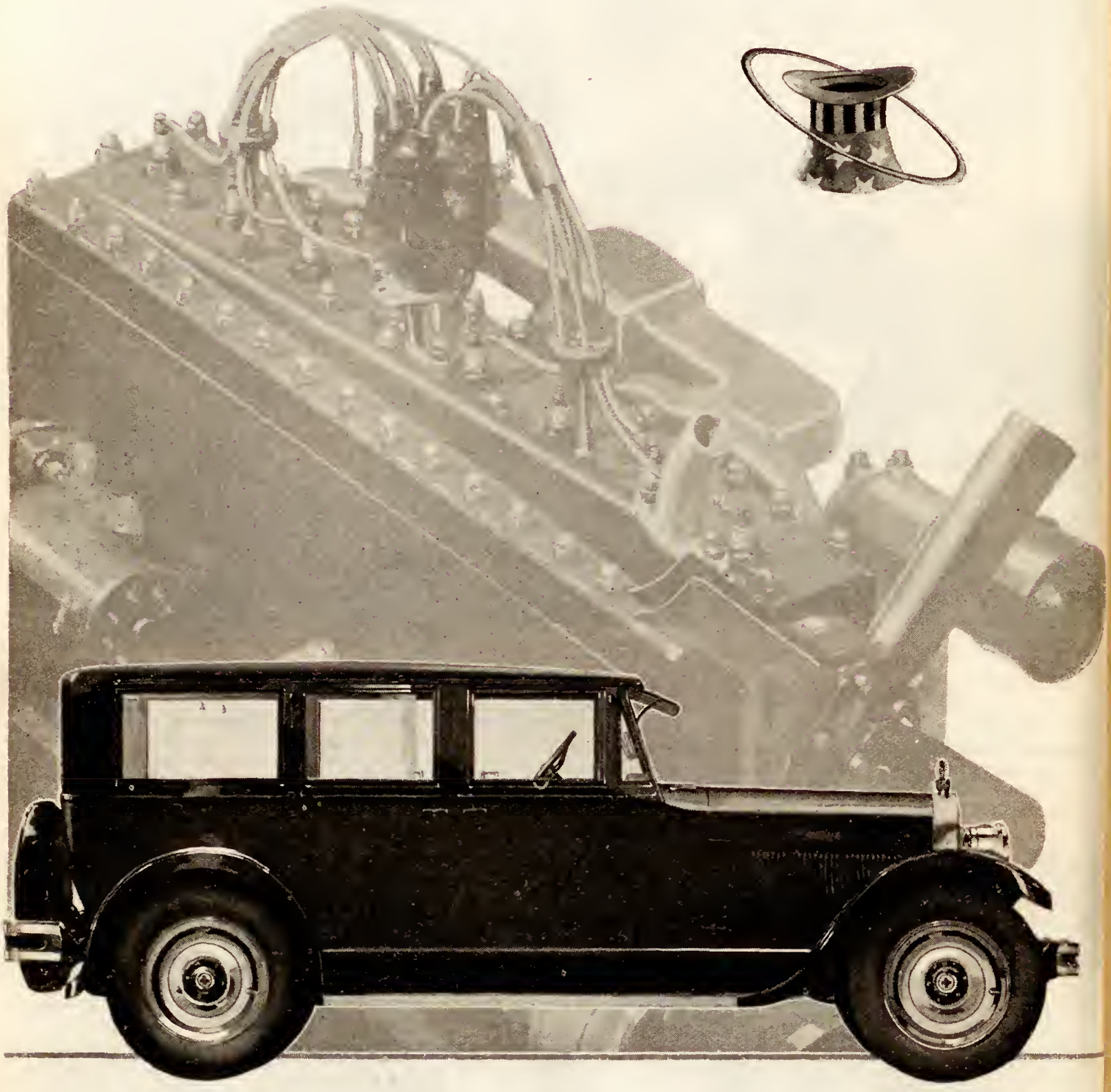


A CLOSE-UP OF THE CONTROL CAR ON THE SHENANDOAH

Contrasting the features of the ZR-3 the main cabin of the Shenandoah is designed for conserving space for practical war-time equipment such as wireless apparatus, instruments for gathering data on scouting cruises, etc. It aims to afford only incidental comforts for the occupants, the ZR-3 on the other hand caters to this particular feature of comfort and luxuriance.

Rickenbacker

A · CAR · WORTHY · OF · ITS · NAME



A new and greater Mile-Master, the Vertical Eight Superfine has all the ability of the famous Rickenbacker Six in a higher degree.

Those who desire and are willing to pay more for the best to be had in performance will find the Vertical Eight the ultimate in satisfaction.

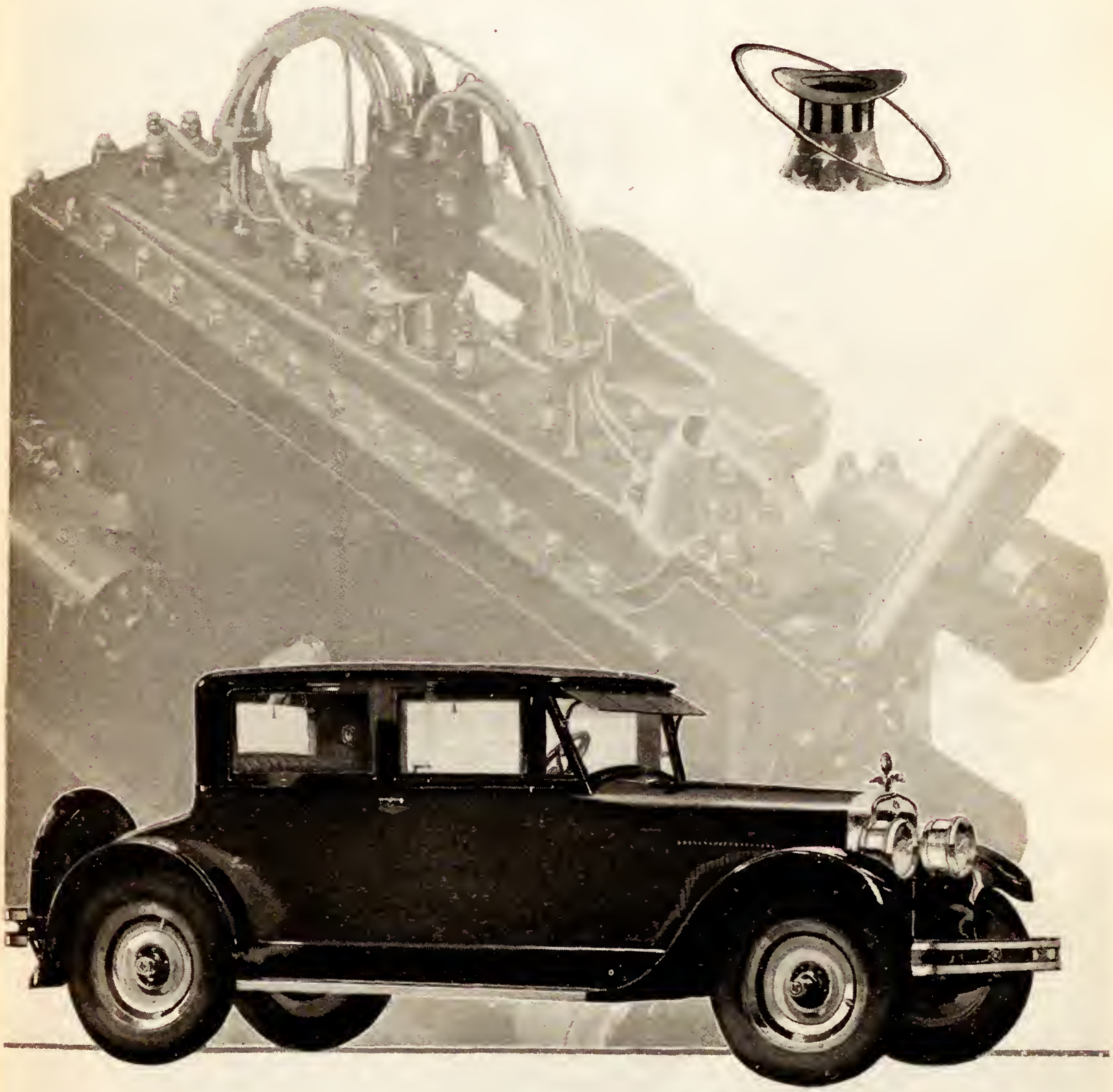
Famous "Six" Prices

Sport Phaeton ..... *$1595 fully equipped*
Coupe ..... *2095 fully equipped*
Sedan ..... *2195 fully equipped*

f. o. b. Detroit—plus war tax

Rickenbacker

A · CAR · WORTHY · OF · ITS · NAME



Like the famous "Six" it is large enough to give the desired results and sufficiently well built to maintain them.

Both models incorporate a great number of advanced engineering developments that place them in the van of technical achievement and are the reasons for the Rickenbacker's wholly remarkable performance.

Vertical "Eight" Prices

Sport Phaeton ... $2195 fully equipped
Coupe ... 2695 fully equipped
Sedan ... 2795 fully equipped

f. o. b. Detroit—plus war tax

THE RICKENBACKER MOTOR COMPANY, DETROIT, MICHIGAN

Johnsons Make Success in Commercial Aviation

SOME four years ago, James M. Johnson and E. A. Johnson organized the Johnson Airplane & Supply Company in Dayton, Ohio. At that time the chance for success in the commercial field looked very doubtful and the Johnson boys were urged not to venture into such an uncertain enterprise. Being Army pilots of long experience the Johnsons were not to be dissuaded and in 1920 they started up business on a leased field a short distance southeast of the city, where they erected a combination hangar, shops, and stock room. With their practical experience they knew just what the builder and user of commercial aircraft needed and set about laying in a supply of the best make ships, motors, parts and accessories.

The great expansion in their business necessitated the forming recently of two corporations, the Johnson Airplane & Supply Company and the Johnson Flying Service, Inc. A new headquarters was opened at Buffalo, New York, the firm taking over the Curtiss Flying Field at this city.

It is doubtful if there is another concern of the kind in the country which carries such a complete and extensive stock of miscellaneous aeronautical equipment, while they ship out daily great quantities of this material to all parts of the United States and foreign countries.

E. A. Johnson Walter Lees J. M. Johnson

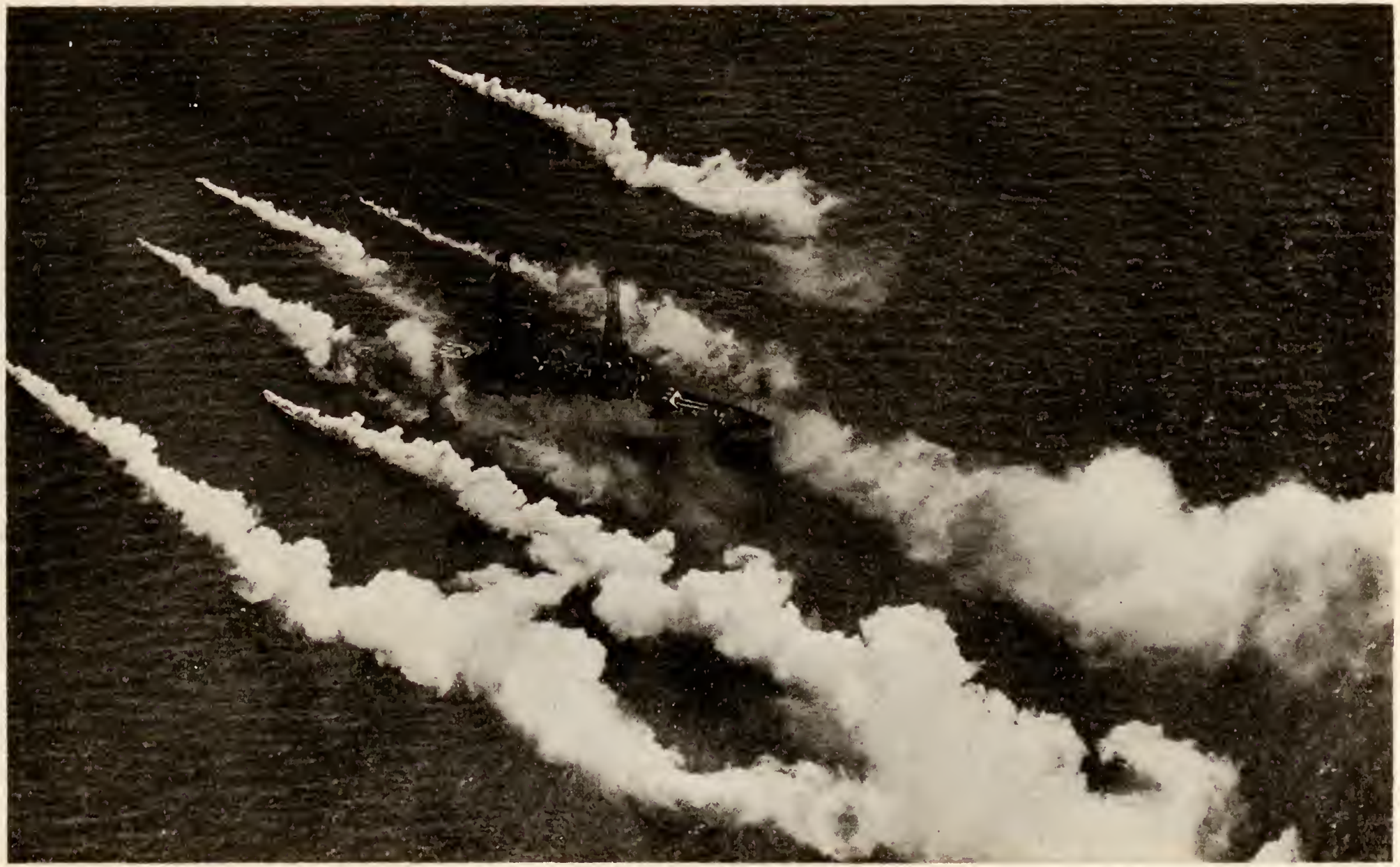
The Johnsons are former test pilots of McCook Field and have equipped their shop with the latest facilities for doing aeronautical work, and conduct their repair and reconditioning work exactly as it is handled at any government repair depot.

Johnson Flying Service, had a singular record of having carried more than 15,000 passengers without a single injury to anyone.

This remarkable record has been used throughout the world as an argument that air travel is absolutely safe and dependable when properly conducted.

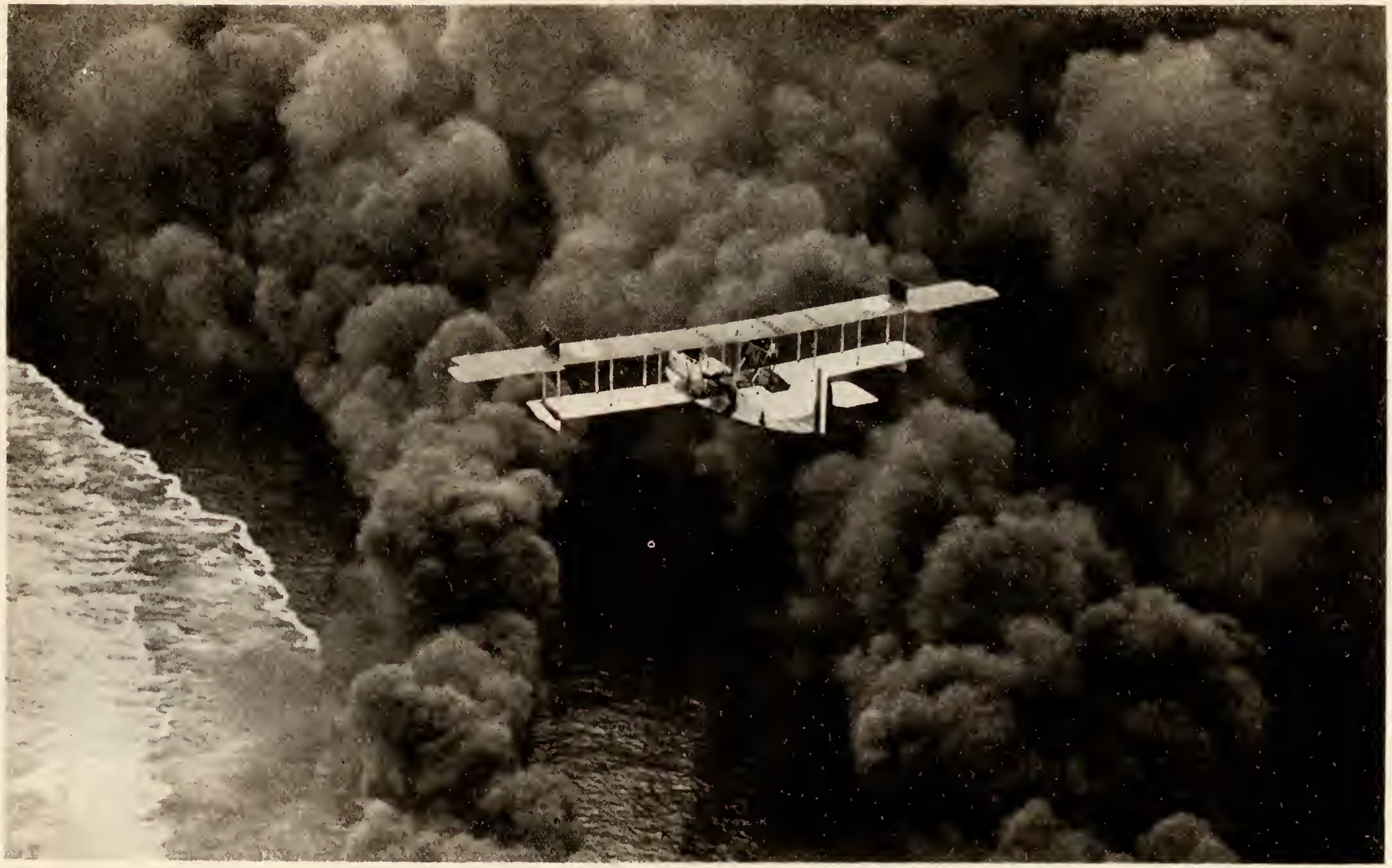
The Johnson firm was one of the winners at the St. Louis Air Races of 1923 and will be well represented at the Races this year. Walter E. Lees, well known pilot is employed by the Johnson Company and will endeavor to again cop a trophy as he did for the Johnson boys at the St. Louis meet last year.

Before leaving Dayton it will repay all persons interested in Commercial Aviation to make a visit to the Johnson field.



Special Permission National Geographic Magazine

A SMOKE-SCREEN CURTAIN FLUNG AROUND A VESSEL BY SEAPLANES



Special Permission National Geographic Magazine

A NAVY PLANE NOSING THROUGH A SMOKE SCREEN

An Idea Changes Thought of Mankind

THE origin, in Dayton, of an idea, now fostered by the loyalty loving citizens—men and women—makes the human family, no matter how remote the habitation, beneficiaries thereof.

The observance in October of an event emphasizing further the progression of aerial navigation, will place Dayton a little higher in the estimation of the world.

Individuals have their necessary parts to play. They enter upon the stage of life's activity, and assist in the promotion of subjects, which bear directly upon the present, as well as providing inspiration for coming generations.

Ideas survive and become perpetuated. Individuals pass on, and are numbered among those who have done, according to their own lights, the fullest possible service.

Rewards are proportionate to the good done the greatest group or groups. In this reflection, gratitude is due the Wright brothers, and those who come after, to "carry on," and bring to a fuller realization the blessings to civilization.

Concretely the ideas born in Dayton are destined, through the instrumentality of the aircraft, to remove jealousy, prejudice and hatred. Peoples in all climes will be brought into closer relationship, and through contact, acquaintance with one another, will ripen into deeper respect and more lasting peace.

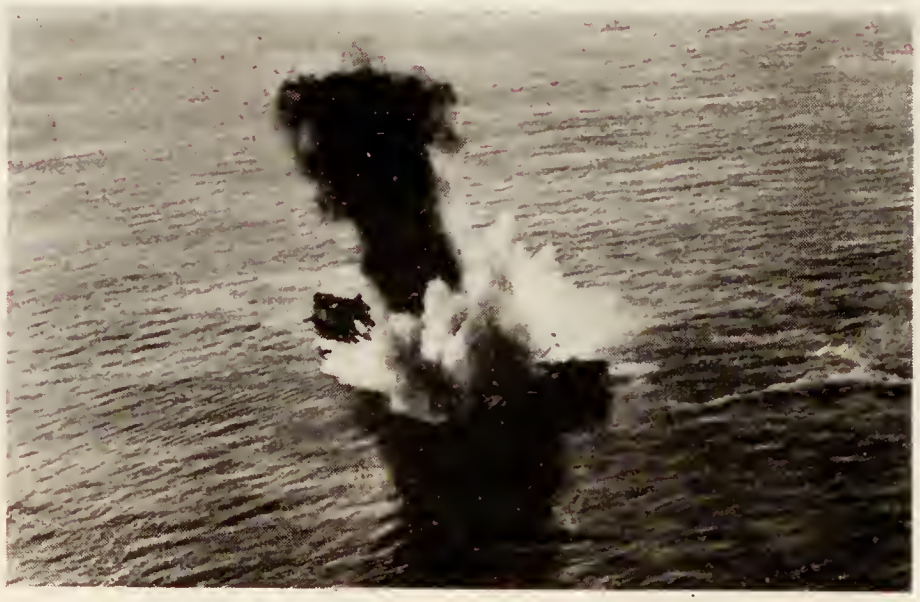
It will mean a demonstration of the second and great commandment, "Love Thy Neighbor."

—*The Third National Bank*
"The Bank of Friendly Service"

BOMBING BATTLESHIPS FROM AIRPLANES

THE joint Army and Navy Air Services of the U. S. have conducted several bombing maneuvers, using real bombs and also real war vessels as targets for the deadly missiles The most noteworthy of these tests were made in June and July of 1921, and in September of 1923, off the coast of Cape Hatteras, N. C.

Martin Bombers (MB-2 and NBS-1 types) were used during the 1923 trials with two obsolete United States battleships as targets. The ships used for targets in the first tests were the German submarine — "U-17," the German destroyer— G-102, the German cruiser, "Frankfort," and the German dreadnaught "Ostfriesland," which were sunk in order named. This bombing test was conducted by the First Provisional Brigade and was composed of pilots from various fields in the service and the equipment consisted of Pursuit, Two Seater Fighters, and practically all of the bombing airplanes in the possession of the Air Services at that time.



When a 2,000-lb. bomb struck the "Virginia."

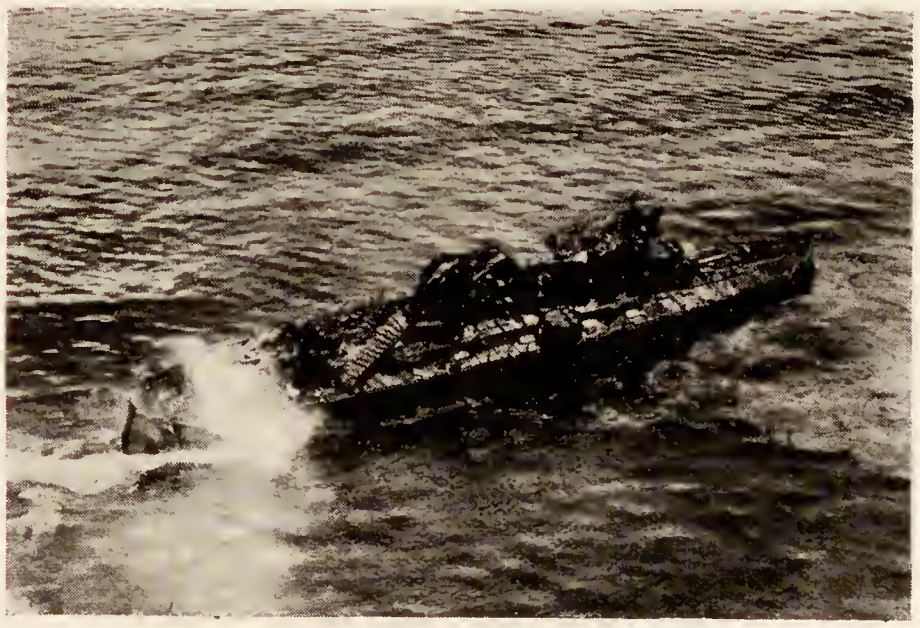
In the 1923 tests the American ships, the "New Jersey" and the "Virginia," were bombed.

The big bomber planes carry bombs in various denominations such as 100-lb., 300-lb., 600-lb., 1100-lb. up to 2000-lb. The bombs were dropped upon the ships from a height of 10,000 to 11,000 feet and by the aid of special bomb-sight devices were able to make a high percentage of direct hits.

The huge bombs filled with high explosive such as TNT are able to put a modern dreadnaught out of commission if it strikes anywhere near the ship. The most satisfactory, destructive results are obtained when the bomb strikes along side the vessel, exploding below the water line.

These bombing tests prove that airplanes are of prime importance as a means of defense to the country against invading ocean fleets. Of course it is quite obvious that the invading fleet will also be accompanied by an aerial defense, which might possibly be able to ward off the bombers or hamper their effectiveness.

The aerial bombs are held in place on the airplanes by "bomb racks," generally located beneath the fuselage. Mechanism within the cockpit permits the occupant to release the bombs by the simple "pressing of the button." On the bombing tests at Cape Hatteras the bombing planes loaded with their deadly freight were forced to fly twenty miles off shore to attack the target ships.

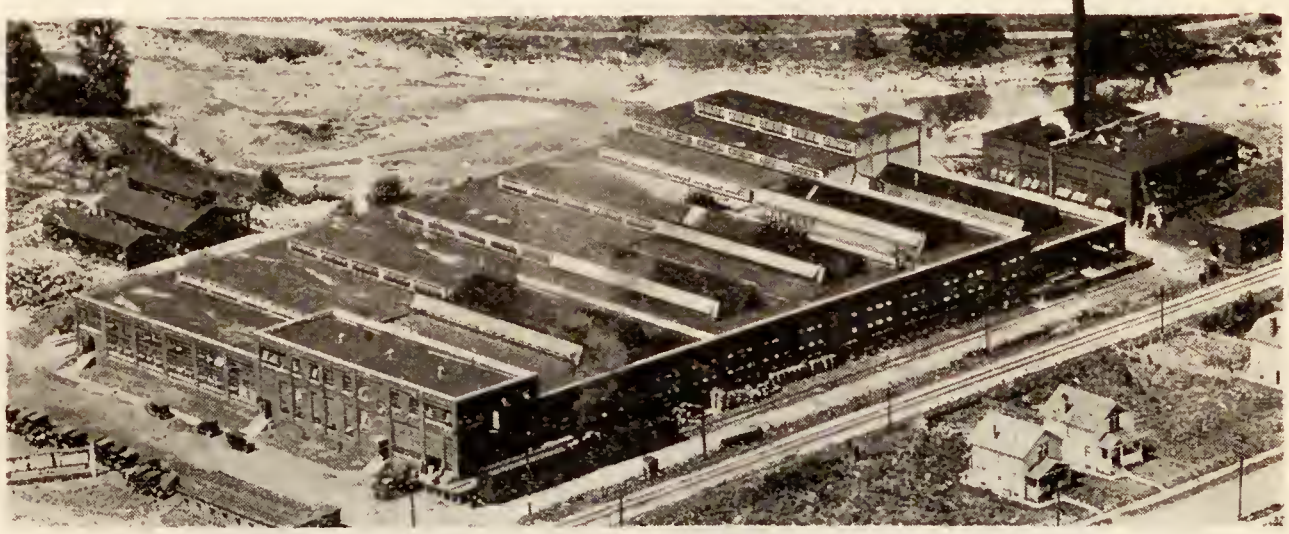


A close-up of the "Virginia" after being hit by aerial bomb— Note hole in after deck.

There has been recently perfected the smoke screen apparatus which permits an aircraft to spread a dense, black smoke curtain about the battleship, making it more difficult to be struck by bombs from the air. Tests of the smoke screen were conducted during the bombing maneuvers and were found highly satisfactory as a defensive measure.

However, with a few well directed bombs it is safe to say that any modern battleship can be put out of commission, or with the additional use of deadly gas bombs make the ships untenable. The odds are all in favor of the aerial bomber.

Airplane view of the Dayton Rubber Manufacturing Company



Home of Low Air Pressure Tires

THE THOROBRED CORD

DAYTON not only pioneered the air, but it is also the home of the pioneer low air pressure tire. Dayton Thorobred Cords were the first tires developed in America to be run with lower air pressure than ordinary cord tires. The double page announcement in The Saturday Evening Post, March 17, 1923, preceded all of the present balloon tire and low air pressure tire advertising with which national magazines and local newspapers are filled today.

The advent of the Dayton Thorobred Cord, especially built to be run with low air pressure, represented the turning point in the tire industry and the greatest single achievement of tire building since the introduction of the pneumatic tire itself.

The present day balloon tire (which is also built by the Dayton Rubber Mfg. Co.) is simply an exceedingly oversized tire made with fewer plies of fabric and thinner side walls, thus providing a greater air chamber, and increased cushioning, or shock-absorbing power. Whether balloons, as they are made today, will render a length of service equivalent to the old time cord tire is still problematical. The Dayton Rubber Mfg. Co. claims (and there is much proof to substantiate their claim) that the Dayton Thorobred Cord is the ideal tire because it combines the advantages of balloon tires with the acknowledged advantages, from a service standpoint, of high grade cord tires. That already there is an obvious tendency on the part of many manufacturers to strengthen their balloon tires, build up their side walls, etc., is ample indication that the best tire for all practical purposes lies somewhere between the old high pressure cord and the balloon as first made by overly optimistic manufacturers.

Everyone knows that the day of hard, highly inflated tires has gone for good. Motorists of today, enlightened by the pioneer advertising of The Dayton Rubber Mfg. Co., and subsequent advertising of other balloon tire manufacturers, know that comfort is to be had and they demand it.

However, the vast majority of automobile owners are not so situated that they can completely ignore or look lightly at the item of expense and up-keep. The vast majority of motorists, while demanding comfort, also demand tires that can be bought or equipped one at a time; that require no expensive making over of their machines, and most important, tires that will deliver the miles—lots of them—with only the minimum amount of trouble.

Perhaps these facts are largely responsible for the unusual amount of business now being done by The Dayton Rubber Mfg. Co.—a business of a volume not even approached in previous years by this company.

FIGHTING INSECTS WITH AIRCRAFT

Showing airplane scattering poison insecticide on the Catalpa Grove, near Troy, Ohio.

THE Gypsy Moth and the Boll Weevil are two insects which are effecting great damage on the North American continent. The former attacking the foliage on forest trees and the latter working havoc in the southern cotton fields.

Experiments in scattering cloud sprays of insecticide from hoppers installed on airplanes and dirigible balloons have been conducted for several years by the Army Air Service working in conjunction with the Bureau of Entomology.

During late years the forest lands in New Hampshire and along the Atlantic seaboard from the St. Lawrence River to Long Island Sound—the summer playground of the eastern States, has been seriously menaced by teeming hordes of the Gypsy Moth, while the yearly output of cotton of the nation is greatly reduced by the ravages of the deadly Boll Weevil which is extremely serious in Texas and Louisiana.

It was Mr. C. R. Neille, a Cleveland, Ohio, Park Department official, who first suggested attacking insects through the aircraft dusting method and his idea was referred to the Experimental station at Wooster, Ohio, where immediate plans were made for carrying out the scheme.

An opportunity to demonstrate the effectiveness of the dusting tests presented itself in the summer of 1921 when a serious outbreak of the Catalpa Sphinx (Ceratomia catalpae), occurred in a valuable catalpa grove on the farm of H. B. Carver at Troy, Ohio.

At McCook Field, Dayton, a Curtiss JN-6 was fitted up and the poison applied by Lieutenant John A. Macready and E. Dormoy, the latter, inventor of the dusting hopper. The plane flew at a speed of 80 miles per hour and at an altitude varying from twenty feet to thirty-five feet above the grove. The insects were completely exterminated. A later test was conducted in May, 1922, on the beautiful Severance Woodland tract at Cleveland where hordes of Canker Worms, which were destroying the trees were likewise killed by the poison dust. In June, 1922, an experiment against the Catalpa Sphinx Caterpillar was successfully conducted at Casstown, Ohio, where another catalpa grove was being destroyed.

Boll Weevil experiments in the cotton belt have been going on regularly every year. Main headquarters are located at Tallulah, Louisiana, where several airplanes have been assigned by the Army Air Services to battle the deadly enemy of the cotton grower.

The climax in insect fighting experiments came about with the departure from Wilbur Wright Field of the OA-1, a giant semi-rigid dirigible balloon in the summer of 1923, for the Gypsy Moth region of New Hampshire. It is said the results of this expedition proves that lighter-than-air crafts have a special advantage in this line of work due to their lower speed.

Insect fighting is an entirely new field for aircraft but no doubt it will develop into one of the most important phases of peace-time usefulness of such machines.

DAYTON COMMUNITY CHEST

THE Dayton Community Chest will conduct its sixth annual campaign in November, after five years of successful work. One of the men who have contributed greatly to this success is John C. Haswell. For the past four years Mr. Haswell has served as president of the organization as well as chairman of the campaign committee.

Combining the budgets of thirty-five local social welfare organizations, the Community Chest has been able to reduce over-head expense and the cost of collecting and administering funds. One campaign instead of thirty-five has been a slogan which

JOHN C. HASWELL
President of the Dayton Community Chest and Chairman of the Campaign Committee.

has brought results in economy and better business methods. More money has been saved for actual work and less has been needed for collection and administrative expense.

"Team work for Dayton" has become the goal of organizations financed by the chest. With the increase of the population of the city and with new problems and needs arising new and special organizations were naturally formed to meet these needs. Sometimes duplication of effort, wasted time and poor service resulted from the fact that many organizations were working without reference to the work of other agencies. By bringing organizations together for cooperation and mutual aid, the Community Chest has been able to assist in getting more work done and in raising the standards of service.

The work of the Community Chest organizations falls into several departments. First there is the care of the sick with the aid of visiting nurses, hospitals and clinics. In addition to care of the sick the health agencies of the chest promote educational activities to reduce sickness and teach people how to "stay well."

The charity, relief and family welfare organizations deal with cases of poverty and dependency. In addition to about 500 families helped by these organizations there are always several hundred cases of children who have become the victims of neglect or cruelty.

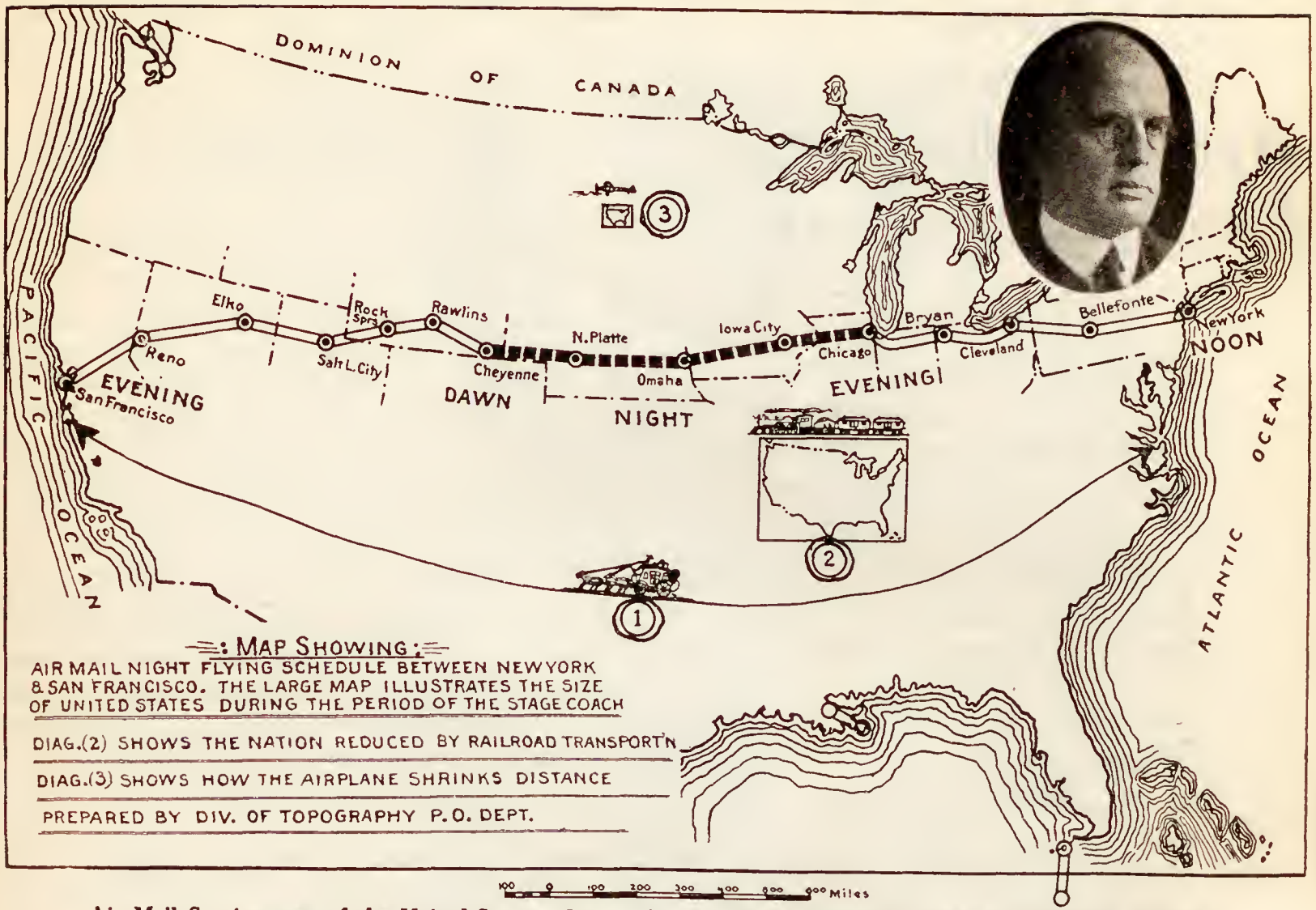
The prevention of juvenile delinquency is one of the aims of the organization which conduct clubs for boys and girls. Playgrounds, organized athletics and recreations and special educational activities are provided. Americanization work, finding homes for homeless children, classes in applied arts, taking care of children while their mothers are working, and special care for crippled children are some of the other activities of the Community Chest.

1924 BUDGET

The following organizations are being financed by the chest this year:

1.	American Legion	$ 3,000
2.	Americanization Work	4,235
3.	Associated Charities	35,000
4.	Association for Blind	3,500
5.	Art Institute	6,750
6.	Babies' Milk Fund	5,000
7.	Barney Community Center	15,500
8.	Boy Scouts	7,600
9.	Bureau Catholic Charities	4,200
10.	Bureau Community Service	21,262
11.	Colored Federation	5,250
12.	Dayton Day Nursery	3,600
13.	Day Nursery (West Side)	2,800
14.	Dayton League for Hard of Hearing	900
15.	Girl Scouts	1,950
16.	Humane Society	4,000
17.	Jewish Federation	17,000
18.	Loretta Guild	8,300
19.	Mary Scott Home	3,600
20.	Miami Valley Hospital	45,000
21.	Playground Association	3,200
22.	Police Women's Home	750
23.	Red Cross	7,600
24.	St. Elizabeth Hospital	45,000
25.	St. Joseph Orphanage	17,77[illegible]
26.	Salvation Army	6,000
27.	Social Service Exchange	1,000
28.	Springfield St. Community House	950
29.	Travelers' Aid	3,15[illegible]
30.	Venereal Clinic	3,000
31.	Visiting Nurses' Association	17,250
32.	Y. M. C. A. Central	69,660
33.	Y. M. C. A. Colored	7,890
34.	Y. W. C. A. Central	40,000
35.	Y. W. C. A. Colored	7,050
36.	Campaign Expense	9,000
37.	*Emergency Fund, Contingent Items and Shrinkage Account	59,650
	TOTAL	$497,377

THE U. S. AIR MAIL



Air Mail Service map of the United States. Insert: Colonel Paul Henderson, Assistant Postmaster General

THE first regular air mail service in the United States was established by our government between New York City and Washington, D. C., on May 15, 1918. Continuously since that date we have enjoyed the more rapid delivery of our mail in various sections of the country. On September 8, 1920, the Post Office Department completed the establishment of a transcontinental air mail route between New York City and San Francisco, which is now the only air mail service in operation by the government.

Since the inauguration of the first route until December, 1923, the Air Mail has operated daily in all kinds of weather, and has carried mail a total of over 6,000,000 miles. More than 225,000,000 letters have been delivered by this service, which has established the remarkable record of completing 92 percent of its trips on schedule.

Each year the Air Mail efficiency is notably increased. During 1923 over one and one-half million miles were flown. More than 65,000,000 letters carried and 96 percent of the flights completed on schedule.

Up until very recently the Air Mail has been merely an auxiliary to train service, transcontinental mail being taken from the trains at various points in the morning, advanced by airplane during the day, and returned to trains at night. On July 1, of this year the Post Office Department established upon regular schedule a permanent day and night air service between New York and San Francisco.

To make this possible it was necessary to light the Postal Airway from Chicago to Cheyenne, approximately 1,000 miles. This lighting followed no precedents. It is the first lighted airway in the world, with a small 5,000 candle power acetylene light flashing light every three miles over 300 of them—with thirty-four electric searchlight type of lamps, of 7,000,000 candle power each, revolving on the top of wind-mill towers at intervals of approximately twenty-five miles, and with five huge half billion (500 million) candle power revolving lights, located on high towers at Chicago, Iowa City, Omaha, North Platte, and Cheyenne, approximately 250 miles apart.

Thus, from July 1, and for seven days a week the mail crosses the continent in an average of thirty-three hours elapsed time.

By fastest train this now requires from ninety-six to one hundred and twenty hours.

The Post Office Department issues special Air Mail stamps in denominations of 8, 16 and 24 cents. The country is divided into three zones—eastern, central and western. Our important mail will be carried by these fast airplanes between any points in each zone for 8 cents; from one zone to another for 16 cents; and from coast to coast for 24 cents.

Leland Assists In Air Races

The thousands of people who attend the International Air Races in October will be attracted by the wireless controlled flying machine, designated as "The Bug."

It is a wonderful creation. The motors for it were furnished according to rigid specifications, by the Leland Electric Co., 218 No. St. Clair street.

This splendid concern in a comparatively brief period has grown into an industry distinctive in its class and highly efficient in its operations.

As exacting as are the requirements of the intricate and delicate equipment of the modern aircraft, the company as a Dayton enterprise, promoted by Dayton people, has entered the field and rendered service, which experts declare to be second to none. Painstaking officials of government authority connected with McCook Field know and appreciate the actual worth of the product.

Thorough laboratory tests together with practical tests made on appliance while in service has brought to well nigh perfection the mechanism of the Leland motor. The line of small motors, manufactured by the company has never lacked the important quality of efficiency. These motors are made for operation on either alternating or direct current and in sizes ranging ⅛, ⅙, ¼, ⅓, ½, ¾ and 1 horsepower.

Outstanding qualities of these motors embrace the reliable non-stalling characteristics, which gives an abundance of power at all times. Thus an unfailing service is given.

In the household, where quiet and comfort are considerations, the operation of these motors, rank them as a standard of comparison. To connect them with many of the electrical appliances in the home indicates the really worth-while merits of the product.

Then again low voltage in different localities, due to overloaded power lines, makes some other motors useless. The Leland motors will invariably operate most satisfactorily under these trying and unfavorable conditions. They never get too hot and this fact adds very materially to the length of their useful life. Leland motors are conservatively rated at 30 degrees centigrade temperature rise. This feature of itself is an insurance against a burnt-out motor and prevents fire hazards.

The operation of the Leland motors are highly efficient, resulting in minimum current consumption and low power bills. Each motor is unconditionally guaranteed for a period of eighteen months.

TRANSFERRING AIR MAIL AT RENO, NEVADA

BENZOL GAS EXCELS ALL OTHERS

Experts at Ohio State University Prove That Caldwell & Taylor's "Original Benzol" Gas Is The King of Motor Fuel

IT may prove of interest to our readers as well as the motoring public in general to know that for some months past, experts at the Ohio State University have been making thorough and minute tests of various kinds of motor fuels, with a view of determining their worth and energy.

These experts realized that since excessive heat has a tendency to break down motor oil and retard proper lubrication the use of a cool-running motor fuel is advisable, and it was with this in view that severe tests were made of "Benzol." Temperatures of the crankcase, oil and radiator were faithfully taken after motors had been subjected to long and gruelling runs and while under full loads. And these tests, according to statements given out officially, proved conclusively that Caldwell & Taylor's "Original Benzol" gas runs cooler in a motor than either high or low test gasoline.

Dayton, Ohio, Plant of Caldwell & Taylor Company.

Users of autos should also know that the tests revealed more mileage obtained from this fuel than could possibly be secured from either high or low test gasoline, proving the Caldwell & Taylor contention that the motorist who uses "Benzol" needs to fill his fuel tank less often.

Today the enemy of the modern automobile motor is carbon. Tests have shown that this forms through gasoline, and that some grades create carbon more freely than others. Tests of several "anti-knock" fuels have been made, as well as tests of preparation declared to accomplish the desired purpose. "Benzol" was tested, too, along with all the others, and the report given out was just as pleasing as the one to the effect that it is the coolest fuel that can be found. "Benzol" forms only a soft carbon that is largely discharged through the exhaust.

Caldwell & Taylor are anxious that motorists in this section get better acquainted with "Benzol," and especially anxious are they that the driving public gets the complete report of Ohio State University tests. The tests were made purely as a research proposition for the information of university students, but any motorist who wishes a complete report can doubtless secure it by writing a request to university officials, and enclosing a self-addressed stamped envelope.

"Benzol" is now being sold at a large chain of stations in Dayton, 15 stations in Columbus, 5 stations in Middletown, and may also be had at stations in Franklin, Miamisburg, Germantown, Greenville, Piqua, Troy, Lima, Springfield, Eaton, Xenia and almost every other town in the state. It will surely pay motorists to look for an "Original Benzol" sign when approaching filling stations.

"Benzol" gas excels all others.

GRAND CANYON OF THE COLORADO FROM ALOFT

Awe-inspiring when viewed from the surface, the Grand Canyon reveals new grandeurs through the airman's camera. This view was taken west of El Tovar.

Special Permission National Geographic Magazine

SUMMIT OF THE GRAND TETON RANGE JACKSON HOLE COUNTRY YELLOWSTONE PARK

Photographed from an altitude of 12,000 feet.

"Kinstle" a Leader in His Line

Though there are a number of people in Dayton who are operating dry cleaning and dyeing establishments there is no one who is better known as regards the general excellence of the work turned out or who is more deservedly popular among all classes at McCook Field and other local air stations than E. W. Kinstle who conducts one of the best equipped plants in his line to be found in this section. Starting operations in a modest way some years ago Mr. Kinstle has by methods of business which are sure to be successful built up a business in his line which is second to none in the city and which will continue to increase the better his work and methods are known. The greatest care and attention are given to all materials treated and the most approved methods now in vogue are used while the workers at the plant are thoroughly painstaking and render efficient and workmanlike service. All kinds of dry cleaning and dyeing is promptly attended to as well as pressing and repairing. It may well be said that the name of "Kinstle" stands for both "Quality and Service" and when that is said all is said. The main office is located at 505 N. Main street and branches at 2280 E. Fifth and 1850 W. Third and work is called for and delivered to all parts of the city.

Slipstream takes pleasure in commending Mr. Kinstle to its readers as he is a booster for aviation and a gentleman who is fully worthy of the success which has crowned his well directed efforts.

Special Permission National Geographic Magazine

ARROW ROCK DAM, ONE OF THE HIGHEST IN THE WORLD. EAST OF BOISE, IDAHO.

The Normal flow of the river below this site is regulated by the streams shooting from the face of the dam. At the time this photograph was taken the summer needs had reduced the water in the reservoir foot by foot. In the late spring melting snows on the mountains fill the reservoirs again. At the end of the dam is an emergency spillway, used to deflect water to an adjoining canyon when there is danger of the water spilling over the center of the dam.

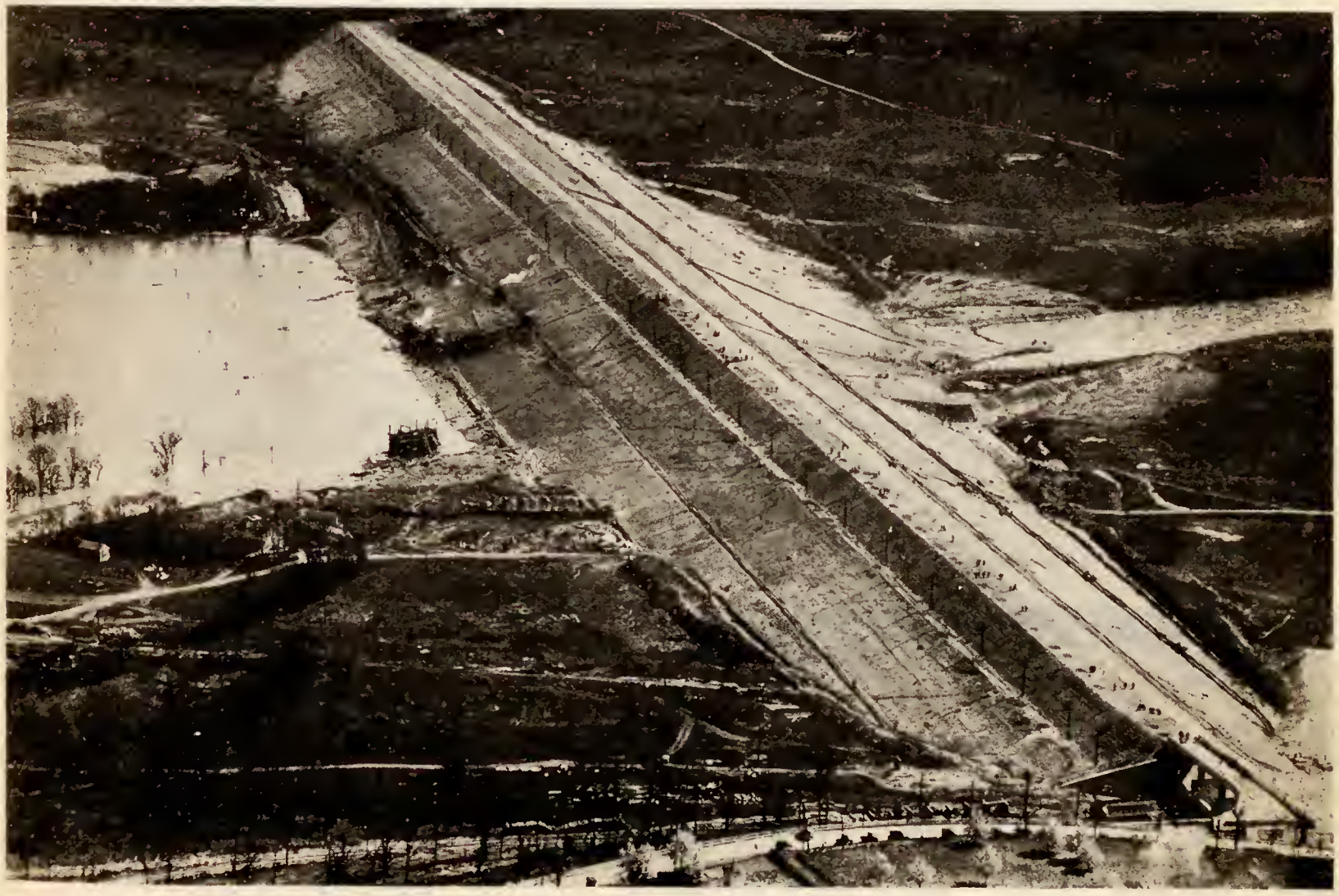


PHOTO CONSERVANCY DAM.

In the spring of 1913, Dayton, Ohio, was visited by one of the most disastrous floods in history. To prevent a similar disaster in the Miami Valley the great Miami Conservancy project wherein a number of flood or retaining basins behind huge dams was resorted to by the inhabitants of the flood district. This stupendous work was enginecred by Charles H. Paul, who incidentally is manager of the International Air Races.

A Cemetery, Yet a Beautiful Garden Spot—A Work of Art, Yet to Nature True

THE Dayton Memorial Park and Cemetery is located on the west side of the New Troy Pike at Stop Ten, just six miles from the Court House. The Dayton and Troy Trolley passes the site.

The site was selected because of adaptability and natural beauty. Away from noise and clatter of dust. Far enough from the center of population so that the growth of the city will not surround it for years to come. Easily accessible by motor bus or street car, yet sufficiently off the beaten path to insure privacy and seclusion.

The land is high and rolling with good, natural drainage and lends itself admirably to landscape and park purposes. All that money and the thought and experience of landscape and cemetery experts can devise, will be expended to make it a most beautiful Burial Park.

Memorial Park is designed on the most modern lines as indicated by experience and good taste, by experts who have made an exhaustive study of cemetery work and follows the park or lawn plan.

The founders realized in the site selected for Memorial Park an ideal location on which to put into concrete form the idea that a burial ground should be a beautiful park.

That death and the necessary funeral arrangements should be surrounded by as few signs and symbols of mourning as good taste and the conventions will permit.

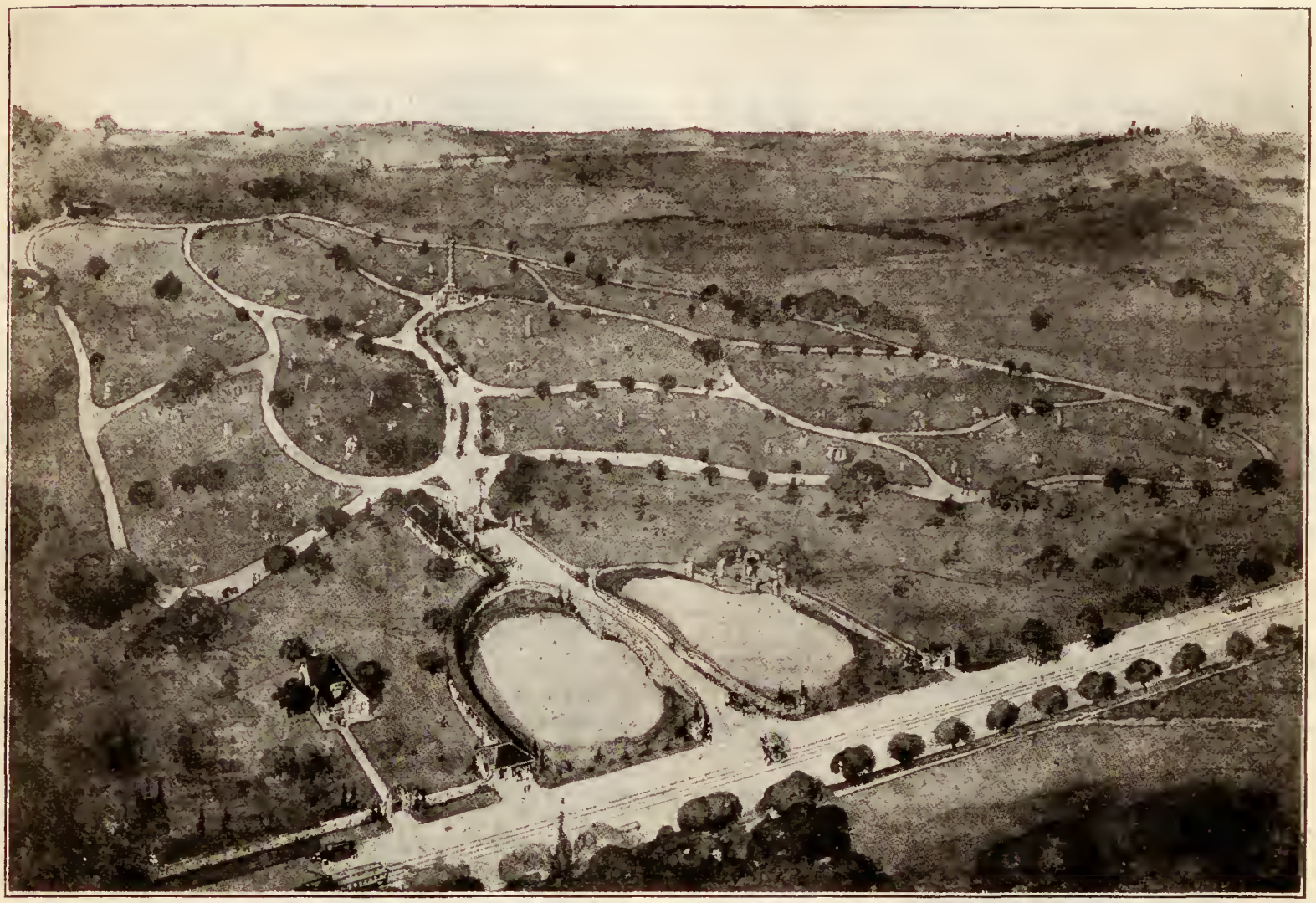
That a saddened heart needs the ministry of the spiritual, of the beautiful and not the assault of the sad and doleful.

That the remains of the departed should rest amid scenes, the cultured beauty of which should be in harmony with their environments during life.

Memorial Park will speak in the language of bloom and blossom, flower and shrub; in the language of sheltering trees, nestling greensward, commanding vista and gentle slope.

Beautiful as the site is today, it is but a beginning, a prophecy of what is to be.

The Grounds are located on the New Troy Pike at Stop Ten, with offices at 304 Mutual Home Building.



The above is a landscape engineer's drawing of Memorial Park which is nearing completion on the New Troy Pike and will give Dayton one of the finest and most complete modern cemeteries in the Middle West. Memorial Park embraces two hundred and seventeen acres and is being developed entirely on the Park and Lawn plan.

IN appreciation of the men whose creative genius made Dayton the Birthplace of Aviation.

HOWARD F. MARSTON

Model H-25, for Men

This stylish belted model in a wide choice of rich tweeds, cashmeres or gabardine can be had for $13.50 or as high as $35.

Model R-22, for Women

You can buy this stylish woman's coat in many different materials at prices from $10 to $30.00.

Model 36 for Children

You can have Weather-proof coats for the boy or girl in a big range of materials for $6.50.

A Comer Representative Will Call at Your Home

THE Comer Plan enables you to select one of these new and better coats for any member of the family—in the comfort of your own home.

Comer coats can be had in dozens of rich fabrics —tweeds, cashmeres, twills, satins and mohairs— at a wide range of prices—in fashionable models turned out by expert designers.

Comer coats are not sold in stores.

A trained representative who lives in your locality will call at your home or office. You will see and feel the actual samples of materials of which these coats are made. You can select from an almost unlimited number of models and fabrics. Careful measurements will insure a perfect fit. And your Comer coat will be delivered to you direct from our factory by parcel post.

Because of this method of selling, the prices of Comer coats are surprisingly low.

Wait for the Comer Representative.

THE COMER MANUFACTURING COMPANY
Dayton, Ohio

COMER
Weather-Proof COATS

240 to 65,000

The Story of Twelve Years of Progress

1912
Started in one small room with 240 square feet of floor space.

1913
Six months later we made our first move to a larger room with 800 feet of floor space.

1914
Our next move. Almost an entire floor with 2,500 feet of floor space.

1916-17-18
Each meant an additional floor with 18,000 square feet of space in all.

1920
We moved into our own new home, a concrete, fire-proof building with 40,000 square feet of floor space.

1924
Two new floors added to our building and a total of 65,000 square feet of floor space.

Twelve years ago The Comer Manufacturing Co. had its beginning in a very small and inconspicuous way. One room sufficed for stock room, shipping room and office.

At that time there was one outstanding idea in the mind of Chas. E. Comer, the company's president and founder. The same thought has been carried through the twelve years of the firm's growth and today it is an ever-present slogan. That thought is this: "Give the customer something more than he or she expects and your customers will make your business grow."

The Comer Manufacturing Company started in business in one little room. Six months later in 1913, the first move to larger quarters was made. Then in 1914 still larger quarters were needed. Two other moves were made after that until in 1920 the company decided to have a home of its own. In 1923 two more stories were added to this building.

Today the company has salesmen in every part of the United States. The incomes of many of these salesmen each year run into five figures. The business itself is considered the largest of its kind in the world.

In the past year the company has added an overcoat and top-coat department which started with such unusual sales that it was necessary to stop the salesmen for a period of several months.

Already the two added floors are crowded with workers and materials and plans for larger space are already under way.

Here is a business that has been built entirely on faith and an abundance of enthusiasm and determination. Mr. Comer has imbued his organization both in the factory and in the field with that spirit.

That people like this plan of buying direct from the factory seems beyond question and the outlook for an ever-increasing business is very bright.

The Comer Manufacturing Co.

APPLE STREET, DAYTON, OHIO

SALIENT NOTES CONCERNING THE ROUND-THE-WORLD FLIGHT

Above—Huge crowds at Paris greet the American World Fliers.

At right—Lieut. Lowell H. Smith, commander of the flight, is welcomed at London by Mrs. Stuart MacLaren, wife of British flier.

IT was The Slipstream Monthly which first made public the plans of the U. S. Army Air Service in connection with the Round-The-World Flight and in a fully illustrated article in the December issue gave the first comprehensive detailed story of the proposed flight.

The purposes of the Round-The-World Flight were to demonstrate the feasibility of establishing aerial communication with all countries of the world; the practicability of travel by air through regions where surface transportation does not exist or at best is slow, tedious and uncertain; to prove the ability of modern type of aircraft to operate under all climatical conditions; to stimulate the adaption of aircraft to needs of commerce; to bring before the people of the world the excellence of American products in the interest of our American aircraft industry; and lastly to bring to the United States the honor of being the first nation to fly around the world.

Spare parts including 35 Liberty Motors were distributed at various points along the route.

Personnel of the Round-The-World Flight: Major Frederick L. Martin (original Commander), Mechanic, Staff Sergeant Alva L. Harvey. Lieutenant Lowell Smith (new Commander appointed after crash of Major Martin in Alaska), Mechanic, Leslie P. Arnold. Lieutenant Leigh Wade, Mechanic, Sergeant H. H. Ogden. Lieutenant Erick Nelson, Mechanic, Lieutenant John Harding, Jr.

Material plans for the Round-The-World Flight were started in January, 1923, when the Chief of Air Service directed communication to Lieutenant Clarence E. Crumrine, then acting as chief of the Airways section at McCook Field, requesting him to make a study of the possibilities of an airplane flight around the world. Lieutenant Crumrine took part in the Alaskan Airplane expedition of 1920. Subsequently a report was made covering a discussion of the proposed route, details relative to equipment, supplies, personnel, climate and terrain, landing fields, special training, etc.

Lieutenant Erick Nelson, another member of the famous Alaskan flight and of the more recent Porto Rico land plane flight, was also designated to assist in the plans for the flight.

A plane similar to the T-2 Army Transport which made the non-stop transcontinental flight was first considered for the Round-The-World Flight but due to the unusual conditions of the hazardous journey a great number of types were studied. After a careful survey, Lieutenant Nelson was sent to Santa Monica, California, to the plant of the Douglas Company where a newly designed "Douglas Cruiser" biplane with a clever arrangement for quickly changing the under-carriage to wheels or water pontoons was chosen for the greatest journey of history.

In order to blaze the trail for the daring flyers a number of advance officers were sent out by the Army Air Service whose duty it was to make arrangements

O. G. FRICKE

Much credit must be given O. G. Fricke, production manager of The Otterbein Press, and past master in the printing arts, for the complete printing of this souvenir edition of The Slipstream.

Through his untiring efforts was made possible the handling by one printing establishment, in record time, the complete printing of this large edition; no small undertaking, considering the large volume of commercial printing and publication work turned out by this firm each day.

Besides being responsible for all production at The Otterbein Press, Mr. Fricke is secretary of the Printing House Craftmen's Club and one of the organizers of this body of Printing Executives.

HENRY C. LANGEFELD

Mr. Langefeld, an advertising man of many years experience, managed the advertising campaign and otherwise rendered valuable assistance in the business management of the Air Race edition of Slipstream.

The group of U. S. Aviators who started from Seattle, Washington, last March. But four of these flyers arrived on the Labrador Coast the early part of September after the six months' battle with the elements and the terrors of the upper ether in all of its varied moods.

at the different points where the planes were scheduled to land, for the eare and comfort of the flyers, seeking out most suitable landing plaees, and training men at these points to eare for the ships when they arrived. These advanee men made photographs and sketehes of the landing places where bases were on land, and of the harbors and elear stretches of water ehosen for landing and take-off from the water. Harbor eharts were also marked to show the best area for landing and take-off, taking into consideration the various prevailing winds. Obstructions sueh as shoals, shallow water, strips uneovered at low tide, wreckage, massed shipping, etc., were also noted. Speeial note was also taken of obstaeles surrounding the landing area, sueh as high hills immediately adjaeent to harbors, long wharves. bridges, overhead wires or cables, radio towers, ships derrieks, etc. Floating buoys were also provided for at each landing place in sheltered water by placing four 500-pound anchors eonneeted with barrels or steel drums painted in bright eolors.

Offieers who were chosen as advance officers for the flight are:

First Division, Seattle to Attu Island in the Aleutian Group, Lieutenant Clayton Bissell.

Second Division, from the Island of Shimushu in the Kurile Island Group of Japan to Chemulpo, Lieutenant Clifford C. Nutt (member of the Alaskan expedition of 1920).

Third Division, from Tsingtu, China, to Calcutta, India, Lieutenant Malcolm S. Lawton.

Fourth Division. from Caleutta, India, to St. Stefano, Turkey, Lieutenant Harry A. Halverson.

Fifth Division, from St. Stefano, Turkey, to London, England, Major Carlyle H. Wash.

Sixth Division, balance of route over North Atlantic through Ieeland and Greenland, thence to Labrador, Lieutenant Clarenee E. Crumrine.

Captain Wm. F. Volandt took charge of Transportation and Finance; Lieutenant St. Clair Street (member of the Alaskan Expedition of 1920)—Routes, maps, general organization and information.

Lieutenant Robert J. Brown, Jr., Chairman, organization and co-ordination.

Lieutenant Erick Nelson, Equipment and Engineering.

Lieutenants Clarenee E. Crumrine and Clayton Bissell, Equipment, engineering and route, advance officer.

Lieutenant Elmer E. Adler, Supply.

The Douglas Cruiser is a strongly built plane of 50-foot wing span. It has a gas eapacity of 592 gallons with 50 gallons of oil. Fully loaded the ship weighs about 7200 pounds. It has an average speed of 100 miles per hour. The "World Cruisers" as the Round-The-World planes were later designated are fashioned after the DT-2 type of Torpedo Plane manufaetured by the Douglas eompany for the U. S. Navy. D. W. Douglas, President and Chief Engineer reeeived his education and training at the U. S. Naval Academy and the Massachusetts Institute of Teehnology. In 1916 he beeame Chief Aeronautieal Engineer in the Air Serviee and eompleted the design for the Type MB-1 Martin Bomber. In 1920 he deeided to enter into business for himself and organized the Davis-Douglas Company which was suceeeded shortly afterwards in 1921 by the Douglas Company.

H. H. Wetzel, Vice President and General Manager entered the employ of the Signal Corps in 1916, as inspector of Airplanes and Airplane motors. He later beeame Aeronautieal Engineer and plaeed in eharge of

Below—The fliers arrive at Croyden Aerodrome, near London, where they are given a hearty welcome.

6 Minutes From Third and Main

Chadwick Heights is a beautiful sub-division of 120 acres—a tract large enough to create a new district, located in the northwest part of Dayton View, 2 miles from center of city—6 minutes drive, the principal streets being Princeton Drive, Cornell Drive and Catalpa Drive extended. The property is being developed with wide curved avenues and numerous parks, with sidewalks, curbing and gutter, city water, sanitary sewer, gas and electricity.

The property is protected with reasonable restrictions, adequate but not burdensome, but with a look toward the future where a home can be built with full confidence.

oo

Invest in CHADWICK HEIGHTS Home-sites; they are highly dependable.

oo

Typical Home near Chadwick Heights

oo

Regular terms, $50.00 down and 1% per month. Special terms may be made in special cases.

oo

OWN YOUR OWN HOME

The first step is to buy a home-site. A lot means a home and a home means a lot.

Start down the road to independence, profit and supreme satisfaction.

Arrange your affairs so you can enjoy the comforts of a home.

Get in on the ground floor. As the property is sold the remainder increases in value and the prices will be raised accordingly.

Every lot is a perfectly good home-site. Select yours today. Representatives on the property.

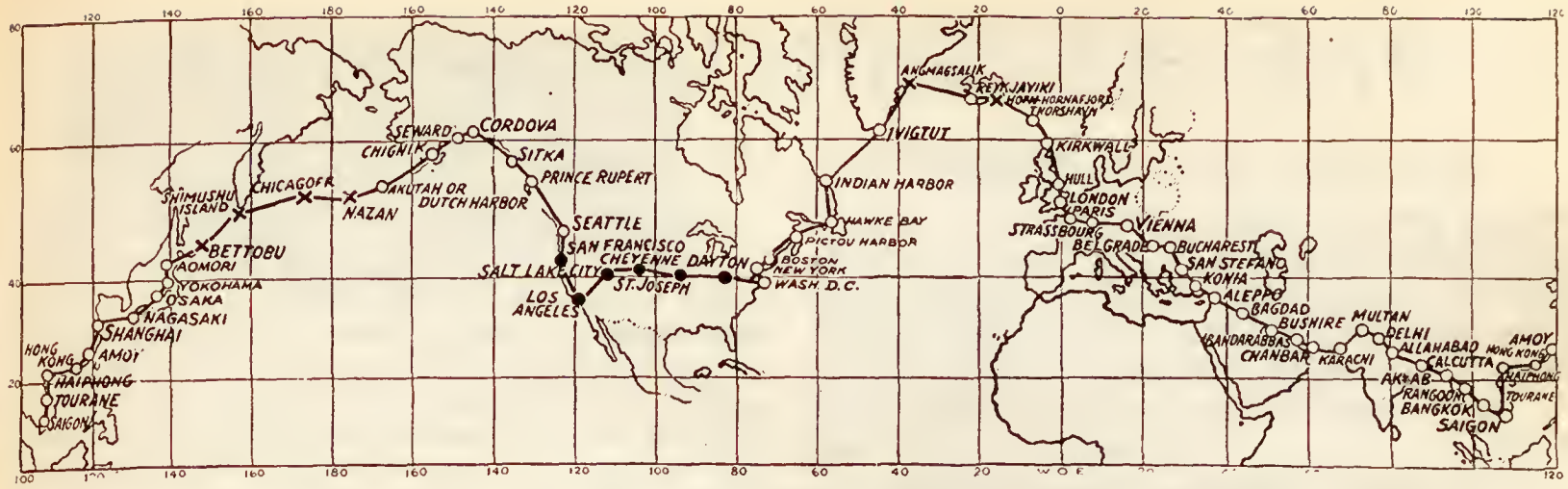
FEATURES THAT INCREASE LAND VALUES

- Property lay-out
- Size of lots
- Width of streets
- Building restrictions
- Surroundings
- Quality of soil
- Drainage
- Class of people who buy
- Kind of improvements installed
- First profit to be taken
- Reputation of local owner developing and
- Sales organization distributing the property

FOR AUTO TO INSPECT, PRICE LIST, PLATS, ETC., CALL, WRITE OR SEE

GEORGE H. SNYDER REALTY COMPANY

GROUND FLOOR 126 NORTH MAIN STREET TELEPHONE MAIN 1904



Map showing complete itinerary of the American Round-The-World-Flight a distance of approximately 26,000 miles.

all inspection and engineering details on the Pacific Coast. He accepted his present position with the Douglas Company in the fall of 1922.

The Route was sub-divided into three main divisions using Seattle, Washington, as a base, thence to Tokio, Japan, thence to London, and return. Note map of completed route for itinerary of flight traveling west to east.

The Flight was scheduled to start from Los Angeles on March 15, 1924, but it was not until the morning of March 17, that three of the four planes to take part in the flight got away at Clover Field, Santa Monica, California, on the initial hop to Sacramento, a distance of 350 miles. The fourth plane piloted by Lieutenant Nelson was not in condition to make the first hop with the others but caught up with the expedition at Seattle, where the water pontoons replaced the landing wheels. At Seattle the four planes were christened as follows: No. 1—"Seattle" piloted by Major Martin; No. 2—"Chicago" piloted by Lieutenant Lowell Smith; No. 3—"Boston" piloted by Lieutenant Leigh Wade; and No. 4—"New Orleans" piloted by Lieutenant Erik Nelson.

FLIGHT GOT AWAY OFFICIALLY AT SEATTLE, APRIL 6

Major Martin and his mechanic, Staff Sergeant Alva L. Harvey were lost in fog near Chignik, Alaska; wrecked plane on mountain side and wandered for days in snow-covered waste without shelter, and living on condensed food. They finally discovered a trapper's cabin where a quantity of food was found, which gave them renewed strength to reach the fishery settlement at Moeller Bay on the Bering Sea.

Lieutenant Wade's plane forced down in North Atlantic, near Iceland and later wrecked when one of the ocean steamers stationed in the Arctic attempted to haul the plane aboard. Lieutenant Wade supplied with a new ship the (Boston II) on the Canadian Coast where he was transported by boat to rejoin the two remaining planes of the group.

Lieutenant Antonio Locatelli, an Italian aviator accompanied by an assistant pilot and two mechanics started with the American flyers on their 825-mile flight from Iceland to the southern point of Greenland. During this flight they became lost in the fog and were later forced down by motor trouble. Drifting for 80 hours on the rough frigid waters of the Arctic the flyers were at last discovered by the American Cruiser Richmond 125 miles east of Cape Farewell.

Harry Hawker, the aviator who first attempted to cross the Atlantic by airplane was rescued in a similar manner after drifting helplessly on the water for many hours.

Lieutenant Stuart MacLaren, a gallant English flyer with two companions, Flying Officer Plenderlieth, and Sergeant Andrews, attempted to make a similar flight around the world in a Vickers-Napier amphibian plane. After surmounting tremendous obstacles they were finally wrecked in the treacherous northern Pacific near the Komandorski Islands.

A Portuguese flight which first aspired to make a world girdling journey ended at Macao, a Portuguese settlement in southeastern China, their first objective after having covered 11,000 miles in 118 hours' flying time.

Major Zanni, an Argentine officer is now commanding a round-the-world flight in planes of a Fokker design. He is now at Hanio, capital of Indo-China.

Side view of the famous Douglas "World Cruiser", American made plane of the type used in the U. S. Round-The-World Flight.

THE SCHNEIDER CUP RACE

Baltimore—October 24

Officials of the Flying Club of Baltimore in conference with a committee of officers of the U. S. Naval Air Service, have finally agreed upon a program for the Jacques Schneider International Trophy Race and the other events scheduled during the same meeting. The dates are Friday, Saturday and Sunday, October 24, 25, and 26.

Admiral William A. Moffett, Chief of the Bureau of Aeronautics, Navy Department, has appointed as committee on general arrangements and cooperation with the Flying Club of Baltimore and the National Aeronautic Association, the following Naval officers with Capt. Emory S. Land as Chairman:

Lieut. Comdr. H. B. Cecil, U. S. N.
Lieut. Comdr. M. A. Mitscher, U. S. N.
Lieut. W. D. Thomas, U. S. N., Commanding Officer, Naval Air Station, Anacostia, D.C.
Lieut. F. W. Wead, U. S. N.
Lieut. T. T. Patterson.

Lieut. F. W. Wead, U. S. N., is in charge of operations for the Schneider Cup Race and he will be in charge of the Naval Team which is to be composed of Lieut. David Rittenhouse, winner last year, Lieut. A. W. Gorton, member of the 1923 team, Lieut. R. A. Ofstie and Lieut. G. T. Cudahy.

The program as agreed upon is as follows:

On Friday, October 24 at 10 A. M., the Navigability & Seaworthiness trials for the Jacques Schneider contestants will be held. This test requires a flight over a 5 mile course during which two distances of one-half mile each might be taxied over on the water, after which the planes are moored out for six hours. This test is calculated to show the seaworthiness of the various craft.

At 12 Noon, Friday, there will be a demonstration of Naval aircraft, details of which cannot yet be disclosed. However, it will include an event which has never yet been seen in the United States.

At 2 P.M., Friday, the Baltimore Sun and Evening Sun Trophy Race will be flown; cash prizes totalling $1,000 are offered by the Baltimore Sun and Evening Sun with a silver cup to the winner of first place. Prizes are sub-divided. $500, $300 and $200 for first, second and third places. This event will be a handicap and the handicaps will be placed by a technical committee which will take into consideration the performance speeds and certain other factors which will be announced on the day of the race. The consensus of opinion of the committees in charge is that the scheme which has been worked out is by far the most satisfactory method for placing handicaps. The distance will be 100 miles, 12 laps of 8⅓ miles triangular course. The planes will be sent away under handicap so that theoretically they should all finish at the same time.

At 4 P.M., Friday, the Flying Club of Baltimore Trophy Race will be flown. This race is limited to torpedo planes of the Scouting Fleet of the U. S. Navy, which planes are practically identical with the World Cruisers which have about completed the trip around the world. Nine planes will be entered in this race and the entrants will be chosen by the Naval Committee on the Schneider Cup Race. The same course as used in the Baltimore Sun Race will be used, namely, 100 miles, 12 laps of 8⅓ miles triangular course.

On Saturday, October 25, the first event will be at 10 o'clock, an Aerial Pageant, during which all aircraft concentrated at Baltimore will be flown. It will include a parade of all types; the laying of a smoke screen; bombing of a target in water; dog fights between fighting planes; trick formation flying, and certain other events which are being kept secret for later announcement.

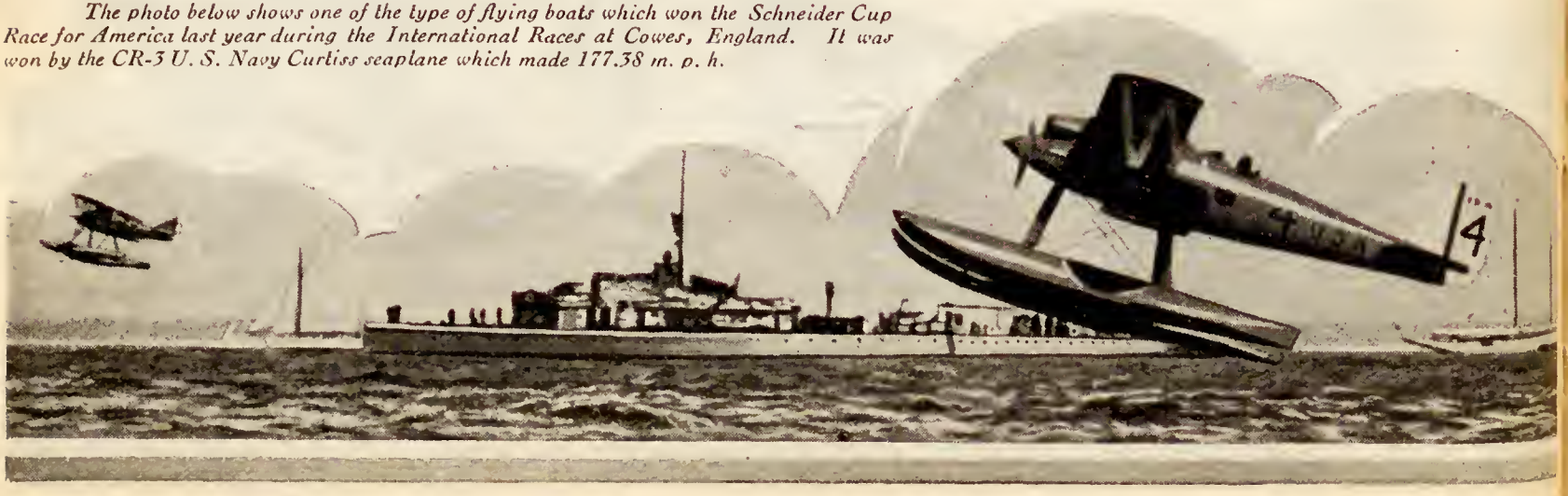
The Jacques Schneider International Seaplane Race will be held at 2 P. M., Saturday, October 25.

The course will be 350 kilometers, 7 laps of a 50 kilometer triangular course.

Late Item: The Flying Club of Baltimore has been advised that Group Captain M. G. Christie, Air Attache of the British Embassy and Colonel C. M. Scott, chief of the Canadian Air Force will be in Baltimore for the Schneider Cup Races.

Captain Christie states "I feel that the Schneider Cup Race will eclipse all other past racing events in many aspects, and although I do not anticipate a British success, I trust our candidates will render a good account of themselves."

The photo below shows one of the type of flying boats which won the Schneider Cup Race for America last year during the International Races at Cowes, England. It was won by the CR-3 U. S. Navy Curtiss seaplane which made 177.38 m. p. h.



THE SLIPSTREAM MONTHLY
PUBLISHED IN DAYTON, OHIO
THE BIRTHPLACE OF THE AIRPLANE
THE CENTER OF AVIATION

Published Monthly by The Slipstream Publishing Co.,
401 Beckel Bldg., Dayton, Ohio,
in the interests of Aviation.

VOL. 5. No. 11

25 Cents the Copy
Canada, $2.25
One Year, U. S., $2.00
Foreign, $2.75
(Postage Prepaid)

Advertising rates upon application. Forms close on the 15th day of the month.

Fred F. Marshall, Lieut. O. R. C.—Editor and Publisher

The Situation of the Aeronautical Magazine

WITH the staging of the International Air Races in Dayton it is only logical that the Slipstream Monthly should issue an elaborate edition in connection with the great event.

Few people realize the struggle it requires on the part of the publisher of an aeronautical magazine to carry on in the face of such adverse conditions in the aeronautical industry. Only a very few aircraft manufacturing concerns are in operation at this time, the greater number of which are looking to Government contracts as a source of business, the commercial demand has not advanced to an extent to warrant many firms going into this field. So long as there is no great general demand for aircraft as a commercial product there is a limited advertising field for magazines of this kind to draw from. Consequently the publisher of the aeronautical magazine who like all other publishers looks to the advertising clientele for subsistence has a discouraging time of it.

Upon the other hand the aeronautical magazine is, without exception the most valuable factor in building up the industry. Without these organs interest will dwindle and progress retarded proportionately.

The Special Air Race edition of Slipstream furnishes as an epitome of the liberal support the aeronautical periodical should receive at the hands of general industrial concerns throughout the nation. This edition is supported largely by Dayton industries who have looked further than the actual sales value of the circulation offered and extended their good will in a manner which is admirable and in keeping with the identification of the city as "a center of aviation."

Out of respect for the manner in which Dayton concerns have stood by the magazine in its periods of incipience it has on every occasion possible boosted the city aeronautically—a service which we trust has reflected favorably in many ways.

Whatever the magazine has done, in this way, let us say here, has been done through extreme sacrifice—in fact a considerable financial sacrifice has been made on the part of the publisher to keep the magazine going in the face of the many difficulties.

Our Souvenir Edition

It is self evident that the Slipstream Monthly published here in Dayton and the only aeronautical publication in this section of the country should in connection with the International Air Races endeavor to compile an edition which would not only prove of value to those who are directly interested in the progress of aviation but also instructive to the public at large.

In the consummation of this worthy effort we have labored earnestly under the most adverse conditions due to arbitrary local conditions which are not in keeping with the progressive ideas of this wonderful and epoch-making twentieth century. While we have received the utmost courtesy and consideration from the leading officers of the National Aeronautic Association as well as those of the local Air Race committee it is but just to state that our efforts to aid from a publicity standpoint in the successful accomplishment of this event of the century in Dayton were retarded to some extent from a source that will seem incomprehensible to all reasonable minds. While the source when properly and impartially directed is an asset of untold value to any modern community it becomes a negligible quantity when used for personal ends to cover up incompetency of judgment in the management of affairs.

In the compilation of the edition the greatest care was exercised in the selection of all reading matter as well as the various illustrations used, and we can justly claim the honor of issuing the largest and most comprehensive aeronautical periodical since the birth of aviation.

Much time and labor has been spent upon it, but it was a labor of love and with the flow of the passing years may the benefits add to the coming glory of that wonderful art and shed a new lustre upon the names and deeds of Wilbur and Orville Wright whose creative genius made Dayton the Birthplace of Aviation.

* * * *

This Special Air Race edition is 100 percent a Dayton product, and we are proud to make public this fact which similar publications issued in connection with the Air Races can scarcely purport. Our printing work was done by the United Brethren Publishing House, the printing ink was purchased from the O'Brien Ink Company, our engraving and art work was done by the Shaw & Marchant Company, the paper used in this issue was manufactured by the Peerless Paper Company—in every case a Dayton concern.

Slipstream, born in Dayton, and supported by Dayton is heart and soul for Dayton.

* * * *

In conclusion the publisher and editor of Slipstream wishes to publicly express his appreciation for the wholehearted and conscientious assistance extended by Mr. Carl Sandstrom. Throughout the period of compiling this edition he rendered valuable assistance, and through his wide experience as a journalist was in position to give valuable advice which culminated in the final success of the Air Race edition. The attractiveness and extent of our advertising display is largely due to Mr. Sandstrom's ability and efforts. Mr. Sandstrom is a newspaper man of long years in the service. He has supervised "special edition" projects for big newspapers in all parts of the United States. Slipstream feels honored to have secured Mr. Sandstrom's services to assist in publishing this edition.

PURPOSE OF THE AIR RACES

BECAUSE the Air Races draw such large crowds and thus assume the atmosphere of a huge circus feature the serious purpose underlying the whole program is for the greater part discarded. In reviewing the Air Race events, with the factors of speed, efficiency, endurance, altitude, utility, etc., having respective value in deciding the winner we call to mind that these things have a definite scientific value.

It is great sport to observe the diminutive speed planes plunging through space at four miles a minute but in time of war the "pursuit" plane is regarded with a deeper significance than as merely a speed race entry. Thus throughout the long list of Air Race events there are underlying factors of practical scientific value which guided the contest committee in enacting numerous rulings and regulations governing the entrants. There is of course much entertainment afforded and with the numerous strictly novel stunts included especially for the casual spectators' benefit the Air Races are made successful from all angles.

REVIEW OF THE 1923 AIR RACES

International Air Races, St. Louis, Mo., U. S. A.
October 4, 5, 6, 1923

PULITZER TROPHY RACE

	PILOT	PLANE	TIME
1.	Ensign A. J. Williams, U.S.N.	Navy Curtiss	243.67
2.	Lieut. H. J. Brow, U.S.N.	Navy Curtiss	241.78
3.	Lieut. L. H. Sanderson, U.S.M.C.	Wright Fighter	230.06
4.	Lieut. S. W. Callaway, U.S.N.	Wright Fighter	230.00
5.	Lieut. W. Miller, Army	Army Curtiss-R-6	218.91
6.	Lieut. J. D. Corkille, Army	Army Curtiss-R-6	216.45

Lieut. Alex. Pearson, piloting a Verville-Sperry Army plane, was forced out at the first lap. During trial flights with this plane previous to the race the "spinner" broke loose at which time it is thought certain damage was done to the duraluminum propeller, throwing it out of pitch thus causing the failure of the plane in the race flight.

MERCHANTS EXCHANGE TROPHY RACE

	PILOT	PLANE	TIME
1.	Lieut H. L. George, Army	Martin Bomber	114.28
2.	Lieut. M. A. Schur, U.S.N.	DT-4	107.62
3.	Lieut. W. S. Hallenberg, U.S.M.C.	Martin Bomber	105.43

BRIG. GEN. WILLIAM A. MITCHELL TROPHY RACE
(All entries from Selfridge Field)

	PILOT	PLANE	TIME
1.	Capt. Burt E. Skeel	MB-3	146.92
2.	Lieut. G. P. Tourtellet	MB-3	143.21
3.	Lieut. T. W. Blackburn	MB-3	141.13

WINNER—MULVIHILL TROPHY RACE

E. G. Lange, President of Illinois Model Aero Club, by flying his model four minutes and twenty-two seconds.

LIBERTY ENGINE BUILDERS TROPHY RACE

	PILOT	PLANE	TIME
1.	Lieut. C. McMullen, Army	Fokker CO-4 (n. r.)	139.43
2.	Lieut. H. K. Ramey, Army	DH-4L	137.54
3.	Lieut. L. H. Smith, Army	Eng. Div. CO-5	135.35
4.	Lieut. G. B. Hall, U.S.N.	Vought UO-1	132.05

AIR MAIL TROPHY RACE
(All entries DH-4 Mail Planes)

	PILOT	PLANE	TIME
1.	J. F. Moore	Plane No. 17	124.98
2.	D. C. Smith	Plane No. 18	120.83
3.	P. F. Collins	Plane No. 67	120.09

CIVILIAN RACES
ON-TO-ST. LOUIS RACE

	PILOT	PLANE	ENTERED BY
1.	C. S. Jones	Curtiss Oriole	Curtiss Exhibition Co.
2.	H. F. Cole	Thomas Morse S4-C	Aero Club of Minneapolis
3.	W. W. Meyer	Heath Biplane	Heath Airplane Company
4.	L. B. Sperry	Sperry Messenger	L. B. Sperry

FLYING CLUB OF ST. LOUIS TROPHY RACE

	PILOT	PLANE	ENTERED BY
1.	W. E. Lees	Hartzell FC-1 (F. Cheravay)	Johnson Air. & Sup.
2.	Perry Hutton	Laird Swallow	Sterling Oil Refining Co.
3.	C. S. Jones	Curtiss Oriole	Curtiss Exhibition Company

AVIATION COUNTRY CLUB OF DETROIT TROPHY RACE

	PILOT	PLANE	ENTERED BY
1.	J. Atkinson	Bellanca CF. No. 12	Bellanca Airplane Co.
2.	Perry Hutton	Laird Swallow	Sterling Oil Refining Co.
3.	C. S. Jones	Curtiss Oriole	Curtiss Exhibition Co.

Who Were The First To Attempt Flight

MEN dreamed of navigating the air long before any means were devised for accomplishing such dreams. Away back in remote antiquity we read of Daedalus, the talented Greek inventor who was imprisoned with his son Icarus on the Isle of Crete. They saved up the feathers that fell into their prison from birds passing overhead and eventually fashioned these feathers into wings, by means of which they effected their escape. Daedalus told young Icarus to "keep his nose pointed up" and to hold his altitude in order to avoid the dampness of the sea, but warned him not to fly too near the sun lest the heat from it melt the wax by which the feathers in the wings were held together. Icarus, like a lot of green fliers of today, disregarded his father's instructions and while trying to inadvertently establish the 2000 B. C. altitude record, got too near old Sol and came crashing to earth for a complete "washout."

There seems to be an absence of aviation news since this epochal event (possibly due to the lack of support given the aeronautical periodicals of the time) and we hear nothing further about flying until about the seventeenth century, when we find an account of a tight rope dancer who attempted to flutter off in the air with artificial "wings." About the same period a Frenchman by the name of Besnier, built a pair of flapper wings with which it is said he could effect hops from elevations. Sir George Cayley, of England, in 1809 is mentioned prominently as an experimenter with gliders. Henson, another Englishman, in 1842, built a contraption driven by a steam engine which he tried to fly. A score of years later Wenham built a model "multiplane" and aided by an associate, Stringfellow, made some progress with the machine, although it was never practically successful. After them, come Prof. Langley, the American; Sir Hiram Maxim, English; Ader, French; Otto Lilienthal, German; and Chanute, American, who all contributed with various experiments.

Then came the Wright Brothers of Dayton, who with ideas strictly their own, and contrary to laws of the air, laid down as indisputable by their predecessors, accomplished practical flight. They learned their secrets largely from studying the flights of birds and observing how the eagle "warped" its wing tips they applied their discoveries to their machine and thereby solved the great problem of controlled flight. The fundamentals of "transverse control" thus brought to light by this discovery, is a truly Wright discovery which ushered in all that was to come later in aeronautical development.

DAYTON AS A MODEL CITY

DAYTON, termed "The Gem City" represents the heart of the beautiful Miami Valley once the favorite camping ground of the Indians and of the more ancient Mound-builders who dwelt here before them. Through a treaty with the red men the site of Dayton together with a considerable additional tract near the junction of the Miami, Stillwater and Mad Rivers was secured and a settlement started at this point.

Dayton takes its name from General Jonathan Dayton, a noted pioneer officer and Indian fighter. while many of the principal streets of the city are christened after early leaders of Indian campaigns such as General Anthony Wayne, General Arthur St. Clair, Colonel Israel Ludlow and General James Wilkinson. Now, as we look down into the peaceful valley so well known to the aborigines we behold where once stood a virgin forest, a flourishing city surrounded by a prosperous community. No more delightful spot can be found on the face of the earth.

THE NEWCOM CABIN

One of the first houses built in Dayton which stood for over one hundred years on the corner of Main Street and Monument Avenue. This landmark is still standing on its modern site along the Monument Avenue river levee.

DAYTON'S WEALTH

The city of Dayton is now known to have well over 200,000 residents. With the immediate suburbs included the city might be said to incorporate a half million people. Dayton has fifteen substantial banks with total deposits of more than $50,000,000. In addition there are eighteen building and loan associations with resources of over a total of $70,000,000. It is estimated that Dayton's yearly wholesale business has a value of some $45,000,000.

Scarcely a life-time ago Dayton could not boast of a single railroad, now she has six steam railroads, six electric interurban lines and eleven street railways.

DAYTON CITY GOVERNMENT

Dayton's municipal government is under the Commission-Manager Plan, which has proven highly satisfactory.

A commission of five members, elected at large on a non-partisan basis serves as the legislative branch of the government and determines all policies.

The Administration is governed by a branch subdivided into five departments of law, service, safety, welfare, and finance. Civil service provisions outlined in the charter regulates employment in the classified service.

The Commission appoints the City Manager.

Dayton has been operating under the Commission-Manager government since January 1, 1914, and lives within its income.

INDUSTRIAL SUPREMACY

Dayton has for years been known as an industrial center. Its products are standard and found in general use all over the world. No city of its size in the world is so broadly advertised by the merit and popular use of its manufactured products.

Such articles as cash registers, printing paper, water systems for homes, business scales, U. S. stamped envelopes, auto tires, motors, starting, lighting and ignition systems, wire wheels, raincoats, malleable iron, golf goods and hundreds of other articles which are used in all parts of the globe, are manufactured in this city.

During the World War Dayton displayed the ability of her industries in turning out instruments and other intricate mechanisms of high precision. For many years the city noted for this feature in manufactured goods, became heralded generally as the Precision Center of America.

In addition to the high quality of Dayton's products her industries are studied generally as models, while several of her factories are recognized as pioneers in the idea of industrial welfare work, now followed by all progressive concerns of the country.

DAYTON'S BEAUTIFUL HOMES

The through traveler misses many of Dayton's more beautiful residence districts, but even the transient wayfarer must marvel at the beauty and

THE NEW MASONIC TEMPLE

Dayton, Ohio, will soon have a beautiful edifice in the New Masonic Temple a view of which is given above. Dayton Masonry has outgrown the old Temple located at 134 South Main Street. In a recent drive to raise funds over $1,500,000 was secured through popular subscription of Dayton members. The new Temple will cost approximately $2,500,000. The proposed new edifice will be located on a four acre tract of wooded knoll at Riverview Avenue and Bellemonte Park, in Dayton View and overlooking the city and Miami River. It will be designed after Greek Ionic style of architecture and will be 160 feet wide fronting on Riverview Avenue, and 225 feet long along Bellemonte Park frontage. The height from the grade to the top of the parapet wall will be approximately 85 feet. There will be three main stories and a basement running under the entire building. Architects are now working in full force getting ready to submit bids for construction work on this magnificent structure which will add both new beauty to Dayton and fresh laurels to Dayton Masonry.

luxuriance of our homes and the "spic-and-span" appearance of our factory surroundings. It was the late John H. Patterson, president of the National Cash Register Company, who first instigated the industrial improvement plan and with landscape gardening and architectural study turned the site of his great plant into one of the beauty spots of the city. Largely through his assistance, his generous gifts of land tracts, natural park sites, etc., the city of Dayton has become noted for its beauty.

HOME OF DAYTON COUNCIL, KNIGHTS OF COLUMBUS

The Knights of Columbus of Dayton possess one of the finest fraternal homes of the country. Visiting knights from other cities will be made especially welcome there, but the K. of C's are extending a general invitation to all visitors to the Air Races to visit them. J. Linn Cochran is Grand Knight and Edw. J. Hanbuch executive secretary of the local council.

In later years dumping grounds have been turned into attractive homesites and unsightly places hidden in a growth of flowers and shrubs. The famous "Slidertown" transformation has been studied the world over and furnished as an inspiration for a general clean-up campaign in thousands of American cities.

DAYTON'S PARKS

Hills and Dales—a natural park to the south of Dayton was presented to the city as a gift by John H. Patterson. No stranger should leave Dayton without visiting this wonderland of shaded nooks and hidden glens. With Community Country Club adjoining it represents one of the largest and certainly the most beautiful municipal park in America.

Community Country Club contains about three hundred acres of rolling land which affords two excellent 18-hole golf courses—three base ball diamonds, soccer and foot-ball grids, club houses, lunch room and a system of camps with all facilities for picnickers.

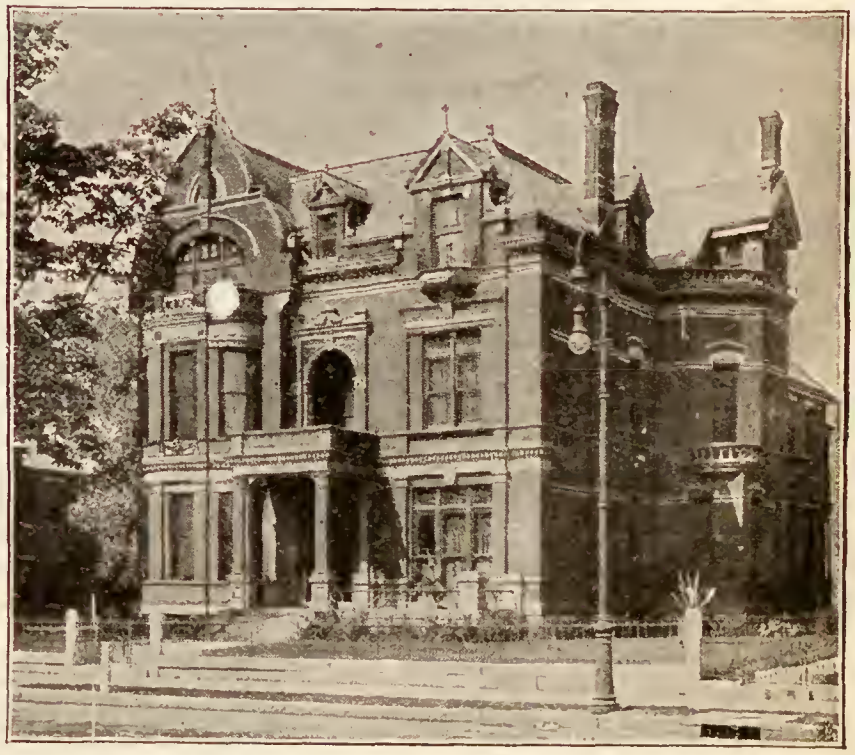
In addition to these playgrounds the city possesses nineteen others in different sections of the city, together with a bathing beach and a tourists' camp all under city supervision.

There are three independent golf courses—the Dayton, the MacGregor and the Miami Valley.

Within a radius of 25 miles of Dayton there are in addition numerous other places of picturesque beauty which will well repay a visit of the nature-lover. The Miami Valley is noted for its prehistoric earthworks left by the ancient mound-builders who lived in this section before the Indians. The most noted of these is Fort Ancient, a mighty fortress built on the summit of a high knoll overlooking the Little Miami River valley. This well known spot is about 25 miles drive from Dayton.

Clifton Falls and Antioch Glen, the latter owned and operated by Antioch College at Yellow Springs, some 25 miles northeast of Dayton are veritable fairylands of natural wonders. There are waterfalls, limestone gorges, high cliffs, an artificial lake and a mighty "Yellow Spring" which has attracted pilgrims for centuries who are drawn there by the supposed healing qualities of the waters and the beauty of the surroundings.

The Ohio Caverns, greatest caverns of Ohio are located a short drive north of Dayton, near Urbana. Near Cedarville, 30 miles northeast of Dayton on the Columbus pike are more mounds and picturesque cliffs well worthy of a visit. Oldtown, formerly "Old Chillicothe," an Indian settlement of the Shawnee tribe is located near Xenia. Here Simon Kenton was made to run the gauntlet and Daniel Boone was held captive.



CASTLE OF KNIGHTS OF PYTHIAS

The beautiful Castle of the Knights of Pythias in Dayton, located at 329 South Main Street. Visiting members of this lodge are extended a cordial welcome to call at the home either for a friendly visit or for information. If you are in trouble perhaps there may be some good friends at the K. of P. Castle who will assist you.

U. S. NAVY SUBMARINE CARRIES "VEST-POCKET" PLANE

Photo by M. Rosenfeld

JULES VERNES tale of Ten Thousand Leagues Under the Sea is outdone with the debut of the XS-1—"Vest-Pocket" airplane of the U.S. Navy.

While we marvel at the great "Shenandoah," largest craft which now plies the air we are both amused and stricken with amazement to learn that a tiny plane which folds up in such a way that it may be stored below deck in a submarine has been perfected.

The Cox-Klemin Aircraft Corporation built the XS-1 for the U. S. Navy and thus furnishes the last link in providing all its vessels with the aircraft which now are considered as essential to a Navy vessel's operation as its guns.

The XS-1. Built by Cox-Klemin Aircraft Corp.

The diminutive XS-1 submarine airplane has all the instruments and equipment of the larger planes, yet it is only one-fortieth the size of the big bombing planes. It is so designed that it may be shorn of its wings and stripped of its pontoons, struts and braces and stowed in the submarine's interior. To re-assemble the plane is a matter of a few minutes' work.

Thus in future wars the aviator will accompany the submarine crew on its mission. When in enemy waters the sub will cautiously come to the surface—the trim little airplane brought from its compartment, quickly assembled and the aviator whisked away on a scouting mission in the twinkle of an eye. If there is an enemy vessel within a radius of several hundred miles the tiny scout plane will locate it, scurry back to the sub with the news, chuck his plane safely away again and accompany the crew on its trip of destruction. With the employment of the little scout airplane it will be possible for the submarine to locate a ship, launch a torpedo and get out of danger without the knowledge of the ship's crew. Without the aid of the airplane a submarine's range of vision from a periscope close to the water level is very limited. The submarine must, therefore, operate at a disadvantage and expose itself to danger which is now eliminated by the scout plane.

A pleasing aerial view of the city of Dayton, looking south over the Main Street Bridge and into the heart of the business district. The Soldiers' Monument erected in memory of Civil War Veterans is discerned in the middle foreground with Steele High School to left of the monument. Dayton's reputation as a city of wide thoroughfares and beautiful bridges is well substantiated in this view from the air.

AVIATION IN DAYTON

DAYTON "ACES" WHO ARE LEADERS IN AVIATION

Reading from Left to Right: Lieutenant Maitland, Lieutenant Alex. Pearson (killed during preliminary trials for 1924 Air Races), Captain H. R. Harris, Hon. James M. Cox, ex-Governor of Ohio and Publisher of the Dayton Daily News, Lieutenant Oakley G. Kelly, Lieutenant John R. Macready, Lieutenant Russell Maughan.

COMMERCIAL

THE development of commercial aviation in Dayton has not only kept stride with the military advancement of aeronautics but the city now boasts of more flying fields in and near it than has any other city in the United States not excluding New York.

Including the airdrome of an international airplane supply house, there are eight flying fields where residents of the Miami Valley may go and take their spin through the clouds at a moment's notice.

The principal as well as oldest concern in Dayton is the Johnson Airplane & Supply Company, Wilmington Pike, east of Oakwood, owned by E. A. and J. M. Johnson.

The Rinehart-Whelan airdrome, known as South Field, on the Dixie Highway, southwest of Dayton, was the second to be established here. This company uses the same field and hangar which served for the lot of Dayton-Wright airplane test work during the war. At the present time the field is in charge of Bernard Whelan, his partner, Howard Rinehart being in Mexico, where he has established two commercial airway routes with the Orville Wright enclosed cruiser.

One of the next entrants in the field is the Old Oak Flying Park, Eaton Pike, managed by Sergeant C. G. Buton. Lieut. Henry Elliot, air service reserve, is the pilot, while Sergeant Buton, who is known all over the country as a pioneer aerial daredevil, performs hazardous stunts to attract visitors each Sunday.

There are two fields along Springfield Pike, the first being operated by Clem Little and the second by H. H. Hunt. H. H. Emerick operates the Avondale Field at Brandt Pike and Community Road, and Ray Fields the Forest Park airdrome. Another field is on the Troy Pike and owned by the Advance Aircraft Company, of Troy, Ohio, a flourishing concern which builds the famous "WACO" plane.

MILITARY

Dayton is the home of two important military fields —McCook Field, seat of the Army Air Service Engineering Division, and Wilbur Wright Field, stamping grounds of the Eighty-Eighth Observation Squadron and the Fairfield Intermediate Depot.

McCook Field was established at the outset of the World War, when the country first realized that aviation was to play an all-important part in the conflict. Money for the project was included in the $65,000,000 appropriation designed to give America an air force second to none in the world.

The engineering division was brought to Dayton largely through the efforts of Col. E. A. Deeds. He pursuaded the government to lease the site which consisted of 254 acres of land on which stood a hangar and a residence.

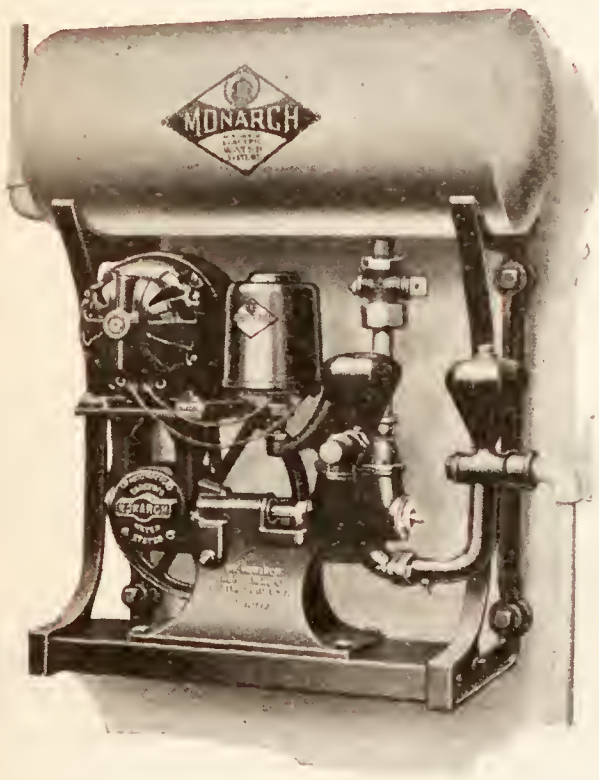
As the engineering division now operates, it is subdivided into six principal sections in charge of specialists in each line. These sections are: airplane section, power plant section, armament section, lighter-than-air section, equipment section and material section.

In addition to these sections there are the flying, maintenance, factory, inspection, technical data and supply departments which share prominently in the experimental work.

During the last few years McCook Field pilots have established fifteen world records recognized by the Federated Aeronautique Internationale. In the course of aerial demonstrations, derbies and performance tests they have broken, unofficially, at least three times that many.

Major J. F. Curry is the commanding officer of McCook Field now. He succeeded Major L. W. McIntosh, who was assigned to the command of the General Staff School, Fort Leavenworth, Kansas.

MONARCH
Pumps and Water Systems



For City, Town and Farm Homes

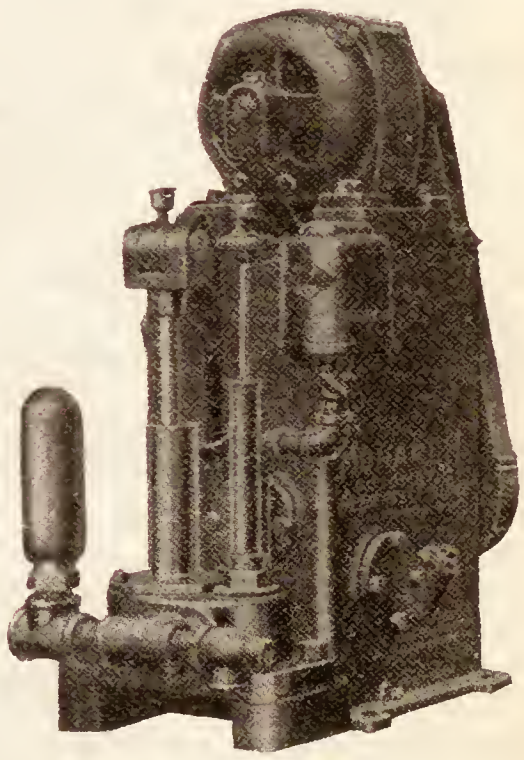
MONARCH
Wall Unit System

Compact low priced pump for domestic service where storage capacity is of minor importance. The source of water supply may be from cistern, lake, well or spring. Distance from low water level to pump must not exceed 22 feet.

The mounting of the tank above the pumps insures the highest efficiency, and the most satisfactory operation of all small systems. The capacity ranges from 120 gallons per hour to 400 gallons per hour.

Exclusive MONARCH *Features*

1. Monarch Two-Pole Automatic Switch.
2. Adjustable Crankshaft Bearings.
3. Monarch Piston Rod Sleeve Guard.
4. Monarch Improved Valve Seats.
5. Monarch Cup Leather Expanded.
6. Monarch Stuffing Box with Double Packing.



MONARCH
Electric Driven Deep Well Pumps

Silent chain drive. The mechanism of this head is entirely enclosed, bronze worm gear and hardened steel worm running in a bath of oil. Worm shaft fitted with deep groove radial and thrust ball bearing.

Repulsion-Induction Type Motors with overload capacity. Any of these deep well heads may be equipped with a 5-ft. Frost Proof Attachment. Automatic Float Switch can be furnished when necessary. Capacity 120 to 375 gallons per hour. Well depth 22 to 250 feet.

THE MONARCH ENGINEERING COMPANY

DAYTON, OHIO, U. S. A.

One of Dayton's Live Automobile Organizations

VERY few automobile dealers in the entire country have sold more transportation equipment than has one of Dayton's own pioneer organizations, The Dayton & Troy Automobile Company, local Ford and Lincoln dealers.

Many thousands of Ford cars, trucks and tractors have been retailed by this progressive concern and many of their cars have found their way into the far distant points of the earth.

This firm was organized when the Ford car was in its infancy and when very few people visualized the wonderful future of this car. In fact, the members of the firm at that time were considered very foolish for venturing in a business project of this kind and only their sincere belief in the merits of the Ford car kept them from turning the agency offer down.

The embryo organization consisted of Wm. J. Sherer, who is president of the company at present, S. S. Faulkner of Troy, Ohio, and the late C. E. Emrick. Headquarters were opened on East Fourth Street, Dayton, Ohio, with a contract of about fifty cars and a territory of about ten counties.

Larger quarters became necessary and the business was moved to First & St. Clair Streets, where it was conducted until after the flood. In 1915 still larger quarters were needed and the present site at Second and St. Clair Streets became the "Home of Personal Service." About this same time, Walter J. Sherer and T. DeWitt Peffley became associated with the company, later becoming treasurer and secretary, respectively. The two latter-named individuals together with Wm. J. Sherer, the president, now form the official personnel of the company.

By adopting a personal service policy that was the talk of everybody, their business increased to the extent that three new buildings have been added and another one leased for their Lincoln Department. Ford cars by the thousands have been sold for several years and the Repair Department was opened twenty-four hours per day for the benefit of their customers. This feature has proved of great value to the public.

A large force of 100 expert mechanics and 15 live-wire salesmen operating under an attractive policy and live management have been responsible for the phenomenal growth of this concern in spite of constantly increasing competitors in the same field of endeavor.

The policy of the Dayton & Troy Automobile Company is based on the theory that the customer must be satisfied above all else and all who deal with this firm are assured of personal attention at all times.

AIR RACE ORGANIZATION

CHAIRMAN
Frederick B. Patterson

VICE-CHAIRMAN
Frederick H. Rike

REFEREE
Caleb S. Bragg

CONTEST AND TECHNICAL COMMITTEE

Geo. B. Smith, *Chairman*
William B. Stout, *Vice-Chairman*
R. W. Schroeder
Dr. G. W. Lewis
Thos. B. Fordham
John Hunt
G. L. McCain
F. O. Clements
H. W. Asire
Robert Insley
Prof. E. P. Warner
B. Russell Shaw

STARTER
Howard Wehrle

ALTERNATE STARTER
L. L. Custer

CHIEF TIMER
Odis Porter

ALTERNATE CHIEF TIMER
C. S. Ricker

CHAIRMAN ASSISTANT TIMERS
Charles M. Kelso

CHAIRMAN OF JUDGES
C. D. Putnam

CHAIRMAN OF SCORERS
Gilbert Eichelberger

CONTEST COMMITTEE N. A. A. REPRESENTING F. A. I.
Orville Wright, *Chairman* Carl F. Schory, *Secretary*
B. Russell Shaw, *Executive Vice-Chairman*

INTERNATIONAL AIR RACES, Inc., 1924

OFFICERS
Frederick B. Patterson, President
Chas. H. Paul, Vice-President and General Manager
Geo. B. Smith, Secretary
W. R. Craven, Treasurer

TRUSTEES

C. E. Burnett
W. R. Craven
Col. E. A. Deeds
John C. Haswell
Col. F. T. Huffman
Ezra M. Kuhns
Frederick B. Patterson
Chas. H. Paul
Frederick H. Rike
Geo. B. Smith
Orville Wright

EXECUTIVE COMMITTEE
Frederick B. Patterson, Chairman

John F. Ahlers
C. E. Burnett
W. R. Craven
Major J. F. Curry
Col. E. A. Deeds
Roy G. Fitzgerald
A. B. Gates
James F. Gibbons
Mayor Frank B. Hale
John C. Haswell
Col. F. T. Huffman
C. F. Kettering
Ezra M. Kuhns
I. G. Kumler
Geo. H. Mead
Walter B. Moore
Frederick H. Rike
Major A. W. Robins
G. W. Shroyer
Geo. B. Smith
Orville Wright

BUDGET COMMITTEE
John C. Haswell, Chairman

S. C. Allyn, Vice Chairman
Paul Ackerman
W. R. Craven
Chas. H. Paul
Urban C. Thies

SUB-EXECUTIVE COMMITTEE
Frederick B. Patterson, Chairman

John C. Haswell
Col. F. T. Huffman
I. G. Kumler
Ezra M. Kuhns
Walter B. Moore
Frederick H. Rike
Geo. B. Smith
Orville Wright

FINANCE
Frederick H. Rike, Chairman

F. J. Ach
W. R. Craven
Col. E. A. Deeds
John C. Haswell
Col. F. T. Huffman
C. F. Kettering
Geo. H. Mead
Geo. B. Smith

SUB-FINANCE COMMITTEE
John C. Haswell, Chairman

Col. F. T. Huffman
Geo. B. Smith

ADVISORY COMMITTEE
Major A. H. Hobley, Chairman

Lieut. E. H. Barksdale
Lieut. W. H. Brookley
Lieut. D. L. Bruner
Lieut. H. R. Harris
Lieut. J. B. Kneip
Lieut. John A. Macready
Lieut. H. H. Mills
Lieut. C. N. Monteith
Major J. H. Rudolph
Major H. A. Strauss
Lieut. C. E. Thomas

ADVERTISING COMMITTEE
T. C. McMahon, Chairman

B. B. Bains
S. G. Somers

ANNOUNCERS

Louis Meister
Chas. J. Cleary

CONCESSIONS COMMITTEE
Robert J. Elder, Chairman

W. F. Bippus
Walter Delscamp
Lieut. S. G. Frierson
I. L. Holderman
E. J. Lauterback
Earl Reeder
Mike Redelle
L. C. Weimer

CONVENTION COMMITTEE
Dr. D. Frank Garland, Chairman

John F. Ahlers
E. J. Barney
J. G. Collison
L. Luzern Custer
J. M. Johnson
Howard S. Smith

DECORATIONS COMMITTEE
Harry A. Brown, Chairman

Roy Cheesman
Fred Fleischauer
C. J. Gehring
O. W. Lambertson
E. C. Lay
Harry Rudd

ENTERTAINMENT AND RECEPTION COMMITTEE
Walter B. Moore, Chairman

Walter M. Brenner
E. G. Burkham
C. E. Burnett
Roy G. Fitzgerald
H. A. Ireland
Miss Nellie Mittendorf
Harry T. Moss
Robert Patterson
Oscar M. Poock
Gov. F. C. Runkle
E. L. Shank

Committee in Charge of Annual N. A. A. Banquet

Chas. Bieser
E. E. Burkhart
Fenton Bott
Thos. B. Fordham
Mayor Frank B. Hale
W. G. Matthews
R. R. Nevin
H. J. Thompson

Committee in Charge of Smoker, October 4

Dr. W. C. Doughty
Theo. C. Dye
Judge H. L. Ferneding
M. M. Haas
C. W. Hosier
Wm. C. Huber
Geo. W. Lane
Ray Laughlins
Earl Reeder
Louis B. Roehm

Committee in Charge of Information of General Service Booths

H. J. Hunt
Paul O'Brian
Russell Tompert
W. T. White

Committee in Charge of Reception and Entertainment of Distinguished Women Guests

Mrs. Kleon T. Brown
Mrs. H. G. Carnell
Mrs. W. G. Clagett
Mrs. Jos. H. Crane
Mrs. Ira Crawford
Mrs. J. F. Curry
Mrs. R. R. Dickey
Mrs. Robert Patterson
Mrs. A. W. Robins
Miss Katherine Wright

Committee in Charge of Reception and Entertainment of Distinguished Men Guests

F. J. Ach
C. E. Comer
R. R. Dickey
J. Edw. Dohse
J. Sprigg McMahon
J. G. Schenck

Committee in Charge of Issuance of Guest Cards to Distinguished Guests

F. M. Callahan

Sub-Committee for Band Music at Race Grounds

F. O. Eichelberger
H. A. Estabrook
O. I. Gunckel
A. W. Holbrook
Chas. F. Hughes

FLYING ENTERTAINMENT COMMITTEE
Major J. F. Curry, Chairman

Lieut. W. H. Brookley
E. A. Johnson
Major A. W. Robins
Carl Spatz
Ben Whelan

GROUNDS AND BUILDING COMMITTEE
Urban C. Thies, Chairman

Howard Arnold
James Atwood
Major J. W. Bagley
Forest Bowman
J. W. Downer
A. L. Freedlander
W. A. Keyes
S. S. King
Peter Kuntz
John Parrott
Lieut. Edward Plank
C. D. Putnam
O. B. Reemelin
Francis Dean Schnacke
E. D. Smith
Harry Williams

HOUSING COMMITTEE

John P. Breen, Chairman

Lieut. Eugene Barksdale
W. G. Culkins
J. T. Daniels
M. J. Deraney
H. D. Dickson
A. Bennett Gates
James F. Gibbons
Lieut. W. S. Hamlin
C. E. Hanscll
Tom F. McGee
J. E. Northway
Harry Patterson
Russell Pryor
W. W. Snipp
Edw. Stoecklein
Henry Stout, Jr.
Ed. O. Wright

R. L. Bailey, Executive

MEDICAL COMMITTEE

Dr. H. H. Herman, Chairman

Capt. James Blackwell
Dr. Wm. A. Ewing
Major R. A. Hale
Major Thos. N. Weldon

PRESS COMMITTEE

Howard Egbert, Chairman

Ted Chryst
Paul Gruner
D. J. Mahoney
Frank McDonald
E. A. Nunan
Dwight Young

PROGRAM COMMITTEE

Walter B. Moore, Chairman

F. J. Blose
Harley J. Broiver
Roy C. Fitzgerald
B. B. Geyer
E. D. Gibbs
T. C. McMahon

PUBLICITY COMMITTEE

B. B. Geyer, Chairman

Clarence B. Greene
Bert Klopfer
Bernard Losh
Horace Lytle
Maurice Hutton
Fred F. Marshall
Walter B. Moore

Max Kohnop, Director

ROADS COMMITTEE

Chas. H. Paul, Chairman

J. J. Baker
F. O. Eichelberger
Col. Frank T. Huffman
Ezra M. Kuhns
John A. North
C. F. Schlesinger
James L. Welsh

SUPPLIES COMMITTEE

Fowler S. Smith, Chairman

Pearl Deaton
Gilbert Eichelberger
Russell Gerkins
R. S. King
R. Schultz

TICKET COMMITTEE

Irvin G. Kumler, Chairman

John W. Aull
R. R. Dickey
Frank Kemper
Tom McGee
Scott Pierce
J. Elmer Redelle

TRAFFIC, TRANSPORTATION, PARKING AND POLICING COMMITTEES

Paul Ackerman, Chairman

TRAFFIC

Parker Bookwalter
C. A. Farrell
S. A. Mosby
H. E. Myers
Wesley O. Pease
Pearle Whitehead
Capt. H. A. Wise

TRANSPORTATION

R. H. Hagerman
C. C. Haines
Theo. Heiland
John L. Miller
M. T. Otto
Walter Stockman
C. V. Yeazell

POLICING

Sheriff Howard Webster
J. H. Woodward

PARKING

Frank Groves
Capt. L. J. Harris

Wilbur Wright Field Organization Co-operating

Major A. W. Robins, Commanding Officer.

First Lieut. C. E. Thomas, Jr., Executive Officer.

First Lieut. Samuel C. Eaton, Jr., Communications Officer.

First Lieut. Harold A. Bartron, Officer in Charge of Property.

Major George A. Brett, Officer in Charge of Reception, Entertainment and Housing.

Major H. J. Knerr, Officer in Charge of Airplane Messenger Service, Ferrying, Exhibitions, etc.

First Lieut. W. J. Hanlon, Mess Officer.

First Lieut. Leon B. Sharon, Officer in Charge of Publicity and Press Relations.

Major J. H. Rudolph, Engineer Officer and operations Officer.

TIMELY INFORMATION FOR VISITORS

"Both Air and Ground"

Where To Get A Room

Guests who arrive in the city without reservations are requested to register immediately at headquarters of the Housing Committee, 122 North Main street, where extensive arrangements have been made for such service free.

This bureau was established several months ago as an integral part of International Air Races, Inc., with the view of listing all facilities in Dayton and within a radius of several miles from the city. The work has been in charge of John P. Breen, chairman of the Housing Committee, R. L. Bailey, executive, and a group of air service officers and business men.

On registering, persons seeking rooms will be given a card assigning them to the place where the desired accommodations can be found. All business of the Housing Committee will be transacted at headquarters.

Housing Facilities

HOTELS

Dayton is well equipped with first-class hotels, the newest of which cost $1,000,000. Those which have made arrangements for taking care of Air Race visitors are:

Miami Hotel, Second and Ludlow streets.
Gibbons Hotel, Third and Ludlow streets.
Phillips Hotel, Third and Main streets.
Holden Hotel, Fifth and Wilkinson streets.
Beckel Hotel, Third and Jefferson streets.
Colonial Hotel, 129 West Fifth street.
Savoy Hotel, 121 West Fifth street.
Antler Hotel, 25 West Sixth street.
Haynes Hotel, Third and Ludlow streets.
Giddings Hotel, 229 South Ludlow street.
Walton Hotel, Ludlow and Sixth streets.
Manhattan Hotel, 225 South Main street.
Auditorium Hotel, 32 East Fourth street.

APARTMENT HOUSES

Following the World War, Dayton underwent the greatest era of building in its history. At one time more than twenty magnificent structures were under construction. Here is a list of the largest apartment houses:

Grand Apartments, 434 Grand avenue.
Chateau Apartments, Miami boulevard.
Harbour Apartments, 245 North Main street.
Sunset Apartments, 242 Sunset avenue.
Far Hills Apartments, Oakwood.
Wirsching Apartments, Palmer avenue and boulevard.
Edgewood Apartments, Edgewood and Eastern aves.
Becher Apartments, Neal ave. and Belmont park N.
Bellevue Apartments, Main street and river.
Sargent Apartments, Salem ave., opposite North ave.
Churchill Apartments, Fifth and Wilkinson streets.
Consolidated Apartments, Plymouth and Central aves.
Riverside Apartments, Liberty and DeKalb streets.
Chesterfield Apartments, 216-218 West Monument ave.

ROOMING HOUSES

The Housing Committee has a list of fifty rooming houses in all sections of the city. Applications for quarters in these may be made when registering. The committee also has 10,000 rooms listed in private homes.

CAMPS

Three large camps and numerous smaller ones in and about the city will be available for use by visitors during the races. The largest is Sugar Camp, a vertible outdoor hotel, which was leased for the occasion by the committee. It will accommodate 248 people and be run on the American plan. It is on the Dixie Highway in Oakwood.

Island Park, the municipal tourists' camp, has facilities for 500 people. This camp is equipped with an electric iron, electric washer, electric lights, a kitchen piped with gas, shower baths and all other necessities.

Forest Park, on the Covington Pike, just outside the city limits, has room for a large number of machines and campers. It is a private enterprise.

OUT-OF-TOWN FACILITIES

To make certain that all visitors will be accommodated with rooms while in the city, the Housing Committee made arrangements with the following nearby communities to handle an overflow crowd:

Springfield, Middletown, Franklin, Miamisburg, Yellow Springs, New Carlisle, Tippecanoe City, West Milton, Troy, Piqua, Greenville, Xenia, Brookville and Eaton.

QUARTERS FOR THE MILITARY

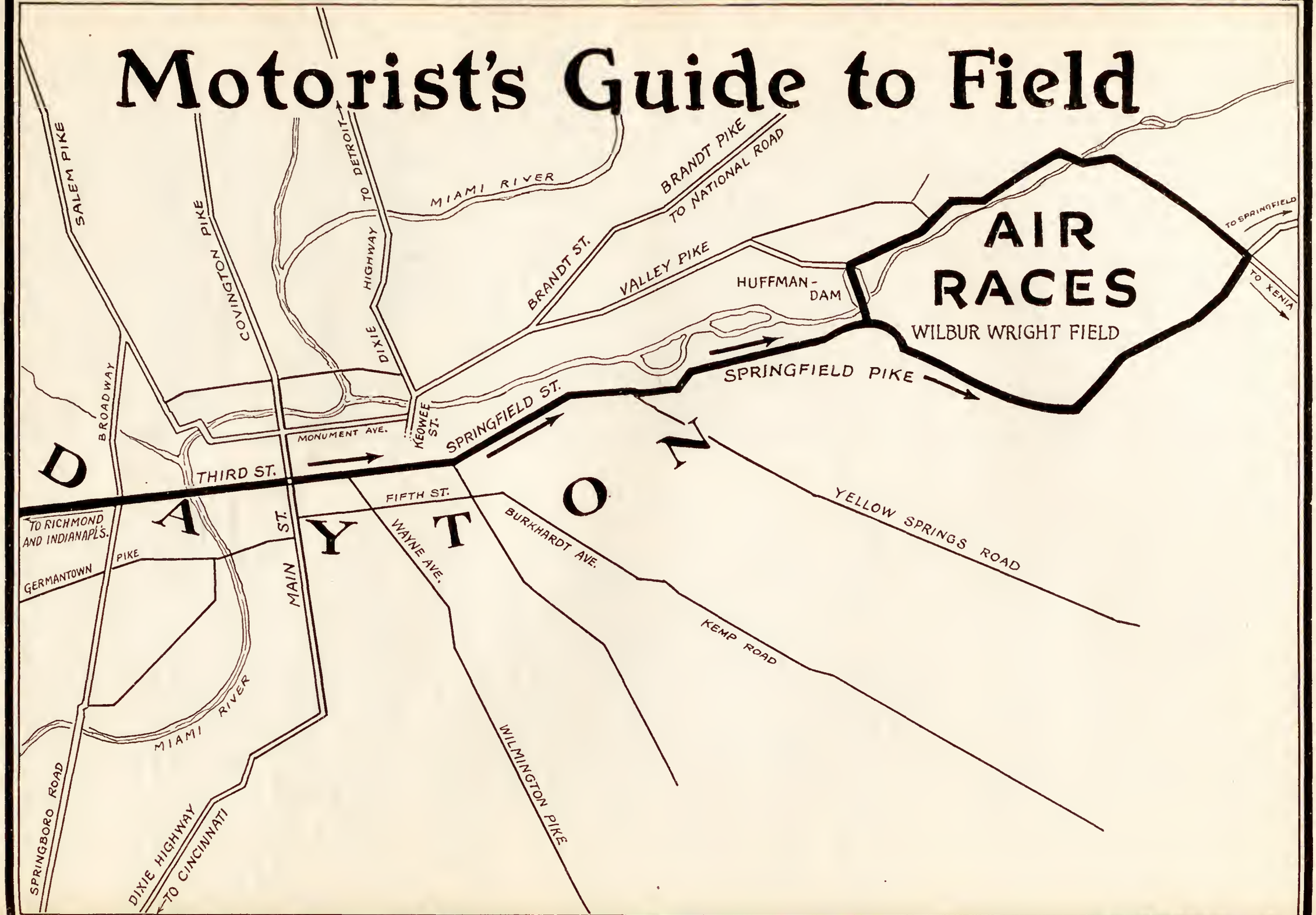
Wilbur Wright Field has made arrangements for accommodating all officers who attend the races except those of high rank who will stay in the city. This was made possible by bringing into use a number of quarters which served during the World War.

FOR CIVILIAN PILOTS

The Civilian Flying Entertainment Committee, under the chairmanship of E. A. Johnson, has provided quarters on Wilbur Wright Field which will be available free of use to visiting pilots. The building, as well as 100 cots, have been furnished for this use by the Air Service.

The Johnson Airplane & Supply Company will also be in a position to furnish spare parts or assist in repair work on all types of ships. There is no other firm in the country which carries such varied and extensive stock of aircraft accessories, instruments and spares. Visiting civilian pilots to the International Air Races will for the first time in the history of the event find themselves well provided for in this respect.

Motorist's Guide to Field



HOW TO GET TO THE AIR RACES

(Note map on opposite page)

BY TRACTION

The Springfield division of the I. C. & E. Traction Company has built a loop at Wilbur Wright Field opposite the entrance for discharging and taking on passengers. Cars will leave the interurban depot on East Third street across from the Library, each fifteen minutes.

BY AUTOMOBILE

Five roads from Dayton will lead to the Air Races site. They have all been repaired and improved recently in preparation for the heavy traffic expected at this time.

Springfield Pike, reached by driving out East Third street to Springfield street, will be open to east bound traffic only from 9 a. m. to 3 p. m. From 3 p. m. to 7 p. m. it will be open only to west bound vehicles.

Valley Pike, reached by driving east on Monument avenue to Keowee street, north on Keowee to Valley street, thence straight out Valley street, will be open to east and west bound traffic.

Yellow Springs Pike will be open east bound all the way to the field and west bound as far as Harris where the machines will be sent over the Harshman Road to Kemp Road.

Kemp Road will be open to east and west bound automobiles. It will also be possible to reach the field by following the Xenia Pike to Zimmerman, thence across to the northeast.

BY STEAM ROAD

"Shuttle" service will be offered by the railroad company. Trains will leave the Union Station each fifteen minutes, and carry 1,000 persons. An unloading station near the grounds is to be constructed.

BY AUTO BUS

In addition to the regular service to Wilbur Wright Field, bus specials will leave at close intervals for the races. These may be boarded at the Auto Park, 135 West Fourth street or hailed on the street.

BY TAXI

Taxicabs may be boarded at any stand and used for conveyance to the races at reasonable prices.

CORRECTED TIME TABLES

Airplane, Railroad, Interurban, Bus

COMMERCIAL AIRWAYS

Inter-city and cross country flights daily to any point. Johnson's Flying Service, Wilmington pike, East of Oakwood; Rinehart-Whelan Field, Dixie Highway, near Moraine City; Avondale Flying Park, Brandt pike and Community Road.

ARMY AIRWAYS

BOLLING FIELD, LANGLEY FIELD, MITCHELL FIELD, Leave McCook Field Monday, Tuesday, Friday and Saturday. Leave Wilbur Wright Field Wednesday and Saturday.

SELFRIDGE FIELD, CHANUTE FIELD, SCOTT FIELD, Leave McCook field Monday and Tuesday. Leave Wilbur Wright Field Tuesday and Thursday.

RAILROADS

CINCINNATI—B. & O.; 4:35, 7:30 a. m.; 12:55, 1:30, 5:35 7:55 p. m. Big Four: 3:47, 5:06, 5:14, 8:07, 8:40 a. m.; 12:37, 2:05, *2:45, 3:58, 5:45, 8:05 p. m. Pennsylvania (C. L. & N.): [illegible]:50, †6:35 a. m.; *1:45, †3:30 p. m.

TOLEDO-DETROIT—B. & O.: 12:05, *7:45 (Toledo only), 9:40 a. m.; 1:36, p. m. Big Four: 9:40 a. m.; 1:46, 11:35 p. m.

INDIANAPOLIS-ST. LOUIS—Penna.: 7:25, 9:00 a. m.; 7:46, 11:03 p. m. B. & O.: 7:30 a. m.; 12:55, 5:35, 7:55 p. m. Big Four: 5:06, 8:40 a. m.; 5:45, 8:05 p. m.

CHICAGO—Penna.: 9:00 a. m.; 10:25 p. m. B. & O.: 12:05, *7:45, 9:40 a. m.; 1:36, 7:55 p. m. Big Four: 5:06, 8:40 a. m. 5:45, 8:05 p. m.

CLEVELAND-BUFFALO—Big Four: 1:12, 10:00 a. m.; 1:30, 4:24, 7:35, 10:40 p. m.

BALTIMORE-WASHINGTON-PHILADELPHIA—Penna.: 10:45 a. m.; 2:30, 6:05, 8:27, 10:53 p. m. B. & O.; 6:50, 9:40 a. m.; 1:36 p. m.

NEW YORK—Penna.: 10:45 a. m.; 2:30, 6:05, 8:27, 10:53 p. m. Big Four: 10:00 a. m.; 2:33, 7:35 p. m. Erie: 3:00 p. m.

COLUMBUS—Penna.: 7:35, 10:45 a. m.; 2:30, 6:05, 10:53 p. m. Big Four: 1:12, 10:00 a. m.; 1:30, 4:24, 7:35, 10:40 p. m.

BOSTON—Big Four: 10:00 a. m.; 2:33, 7:25 p. m.

AKRON-YOUNGSTOWN—Erie: 9:50 a. m.; 3:00 p. m. Penna: 2:30 p. m. B. &. O.: 12:05, 9:40 a. m.; 1:36 p. m.

CHILLICOTHE—B. &. O.: 6:50 a. m.

*Signifies daily except Sunday.
†Signifies Sunday only.
All other trains operate daily.

INTERURBANS

(Eastern Standard Time.)

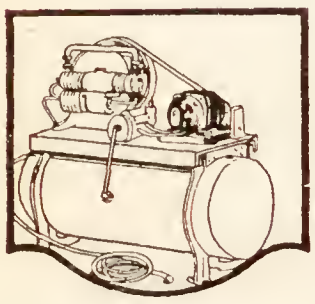
C. & D.—To Cincinnati—Local cars: 5:00, 6:00, 7:00, 9:00, 11:00 a. m.; 1:00, 3:00, 5:00, 7:00, 8:00, 9:00, *10:00, *11:00, 12:00. *Middletown only. Limited cars: 8:10, 10:10 a. m.; 12:10, 2:10, 4:10, †6:10 p. m. Hamilton only. †Limited to Hamilton only, local beyond. Additional cars leave Third and Main streets for Miamisburg every 30 minutes.

I. C & E.—To Union City—6:15, 8:00, *9:00, 11:25 a. m.; 1:15, 4:25, *5:05, 6:10, †11:00 p. m. *Brookville only. †Greenville only. To Columbus: Limited: 8:00, 10:00 a. m.; 12:00, 1:00, 2:00, 4:00 p. m. Locals, 5:45, 6:45, 8:45 a. m.; 2:45, 4:45, 6:00, 8:15, †10:30 p. m. †Springfield only.

continued on page 113

Leland Motors

A Standard of Comparison

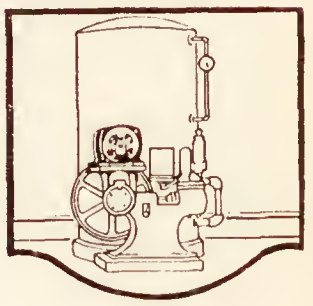


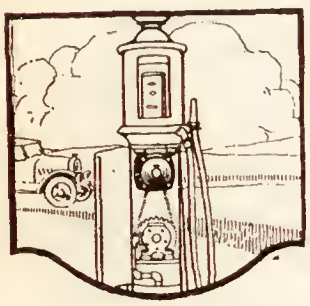
ELECTRICAL Appliances of the finer makes have Leland motors as their preferred choice. When it comes to reliability and dependability Leland motors are indeed a standard of comparison.

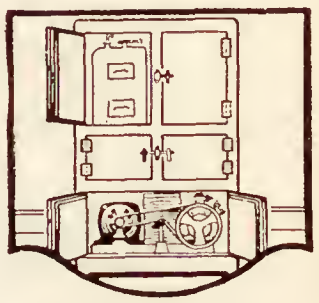
Fundamentally they are correct in design and embody only such principles as have proven of merit in the past.

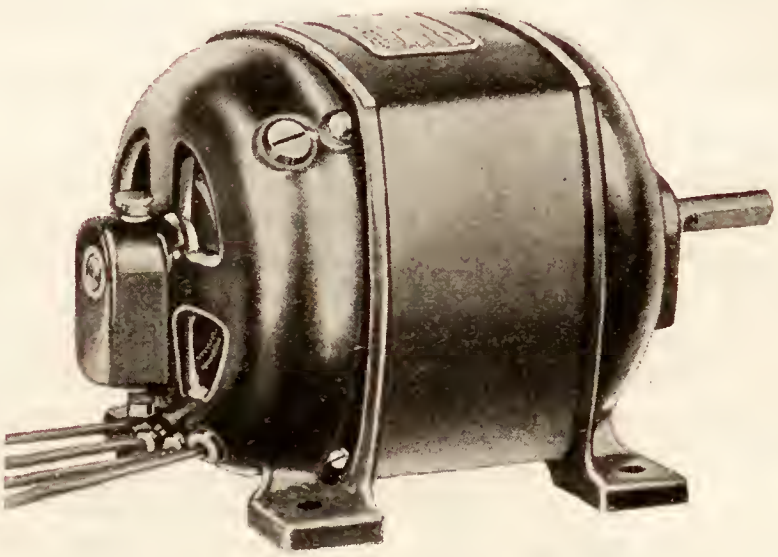
They are conservative as to ratings. This feature together with good workmanship and materials contribute to Leland quality and gives to the user an indescribable feeling of security and thoroughness.

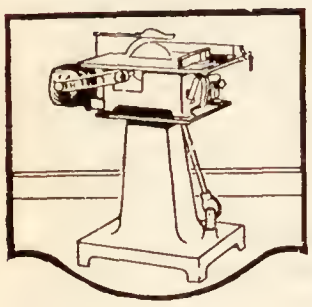
Quality foremost in Leland motors means electrical motor driven appliances that dominate. For that reason appliance manufacturers do not let a few cents difference in cost interfere with their obtaining Leland quality.

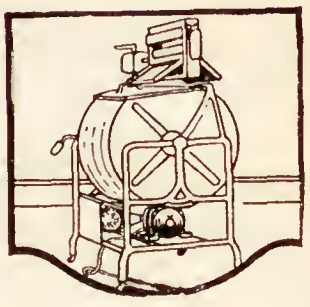












Sizes ⅛, ⅙, ¼, ⅓, ½, ¾, and 1 Horse Power.
Alternating Current Single Phase Repu sion Induction.
Alternating Current Two and Three Phase Induction.
Direct Current Compound Wound.

The Leland Electric Co.

Dayton Ohio U. S. A.

Visitors are invited to inspect our plant located at 215 North St. Clair Street—Opposite Memorial Hall.

D. S. & X.—To Xenia—Local cars: 6:00, 7:00, 8:00, 9:00, 10:00, 11:00, 12:00 a. m.; 1:00, 2:00, 3:00, 4:00, *4:30, 5:00, *5:30, 6:00, 7:00, 8:00, 9:00, *10:00, †11:00 p. m. *Saturdays and Sundays only. †Saturday only.

(Central Standard Time.)

D. & W.—Locals—Lv. *5:00, *7:00, *9:00, *11:00, 12:00 a. m.; †1:00, †3:00, 4:00, †4:35, ‡5:00, *6:00, †7:50, *9:40, ‡11:00. Express, 6:00, 10:00 a. m.; 2:00, 4:00. Hoosier Specials, 8:00, 12:00 a. m.; 7:00 p. m. *Richmond only. †West Alexandria only. ‡Eaton only.

D. & T.—To Lima—Limited cars: 7:10, 9:10, 11:10 a. m.; 1:10, 3:10, 5:10 p. m. Local cars: 6:00, 8:00, 10:00, 12:00 a. m.: 2:00, 4:00, 7:00 p. m.; 6:00 p. m. to Wapakoneta; 8:00 p. m. to Tippecanoe; 9:00 p. m. to Sidney; 11:00 p. m. to Piqua.

D. C. & P.—To Piqua—Local cars: 6:00, 7:00, 8:00, 9:00, 10:00, 11:00 a. m.; 12:00, 1:00, 2:00, 3:00, 4:00, 5:00, 6:00, 7:00, *8:00, 9:00 †10:30 p. m. *To West Milton week days; to Piqua Saturdays, Sundays and holidays. †To West Milton.

BUS

(Daylight Savings Time.)

OSBORN—FAIRFIELD; 7:00, 7:35, 11:00 a. m.; 2:15, 3:30, 5:15, 6:00, 11:30 p. m. Sundays; 5:50, 8:00, 11:00 a. m.; 3:00, 5:30, 11:30 p. m.

BELMONT-BEAVERTOWN; 6:15, 7:25, 8:25, 9:25, 11:25 a. m.; 1:25, 3:25, 4:25, 4:55, 6:25, 9:25, 11:00. Saturday and Sunday, 11:25 p. m.

LEWISBURG; 7:30 a. m.; 2:30, 5:45 p. m. Sunday; 8:30 a. m. 12:30, 3:00, 4:30, 5:45, 11:00 p. m.

WAYNESVILLE; 7:00 a. m.; 1:00, 5:00 p. m.

GERMANTOWN; 7:00, 9:30 a. m.; 12:30, 5:00, 6:00 p. m. Holidays, extras at 8:00, 11:00 a. m.; 3:00, 5:15 p. m. Saturdays only, 4:00 p. m. Sunday only; 9:15 a. m.; 3:00, 5:30 p. m.

TROY-PIQUA-SIDNEY; 5:55, 6:55, 7:55, 8:55, 10:55, 11:55 a. m.; 12:55, 1:55, 2:55, 3:55, 4:55, 6:55, 7:55, 8:55, 9:55, 11:15 p. m.

GREENVILLE; 6:00, 7:00, 9:00, 11:00 a. m.; 1:00, 3:00, 6:00; 8:00, 11:00 p. m.

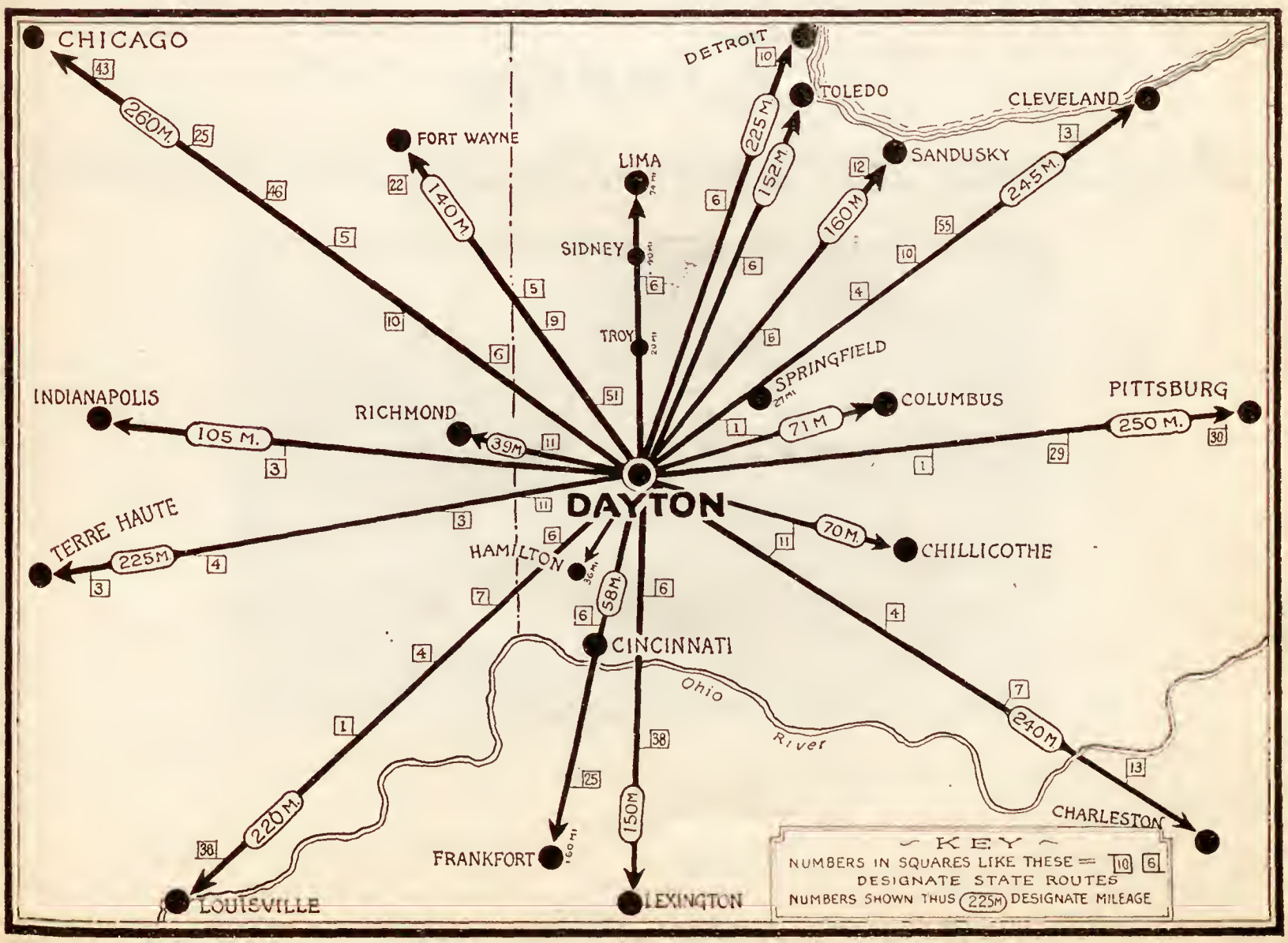
SPRINGFIELD-COLUMBUS; 6:55, 7:55, 8:55, 9:55, 10:55; 11:55 a. m.: 12:55, 1:55, 2:55, 3:55, 4:55, 5:55, 6:55, 7:55, 8:55, 9:55 p. m.

LEBANON; 8:00, 10:00 a. m.; 1:30, 5:30 p. m. Saturday only, 6:15 p. m.

XENIA; 6:30, 8:30 a. m.; 12:30, 6:40 p. m.; Monday,, Tuesday, Thursday and Friday extras at 9:15 a. m. Wednesday, Saturday and Sunday, 11:30 a. m.

ZIMMERMAN; 6:30, 8:30, 10:30, 12:30 a. m.; 2:30, 4:20, 5:30, 6:40 p. m. Same extra schedule as for Xenia.

Aviators' and Tourists' Map Showing Main Highways Leading to Dayton



The Gem City Life, Dayton's Only Life Insurance Company

THE Gem City Life has become one of Dayton's most successful enterprises—showing a rapid and healthy growth during the past year.

Among the various cooperative enterprises which have had their inception here in Dayton the "Gem City Life" must be accorded a front rank. Incorporated as an old line life insurance company in 1911, under the laws of the state of Ohio, it has during the flow of the passing years, maintained a steady and vigorous growth until today its accredited representatives are transacting business for the company in Ohio, Georgia, District of Columbia, Alabama, Louisiana, Minnesota, Michigan and Nebraska and it may be pertinent to add that the past year has been the most productive in the volume of insurance issued in the history of the company. The Gem City Life specializes in non-participating and group life insurance and the various policies embody in their provisions the most modern and liberal terms, consistent with the ethics of old line insurance companies.

Another feature of the company's activities is the department devoted to Accident and Health Insurance which has become an important part of the business. All the beneficial features to be found in the most liberal Accident and Health policies of the period are incorporated in those issued by this company.

The citizens of Dayton take due pride in the continued progress made by this home enterprise which goes forward to a prosperous future. Its officers and directors are noted as among Dayton's most representative men of affairs while the general management is in the hands of I. A. Morrisett who is a gentleman of well known executive ability who is well and widely known in the insurance world.

EVENTS IN CONNECTION WITH THE THE AIR RACES

NATIONAL AERONAUTIC ASSOCIATION

The third annual convention of the National Aeronautic Association will be held October 2, 3 and 4, at the Miami Hotel with President Frederick B. Patterson presiding. It will bring together the leading authorities on aviation in the United States.

Headquarters and registration and information booths will be established before the convention opens for the benefit of early arrivals. Following the committee meetings on October 1, the convention will get under way at 9 a. m., October 2.

The big banquet will be held in the hotel Friday evening. Invitations have been extended the highest officials in the land as well as many foreign dignitaries. The dinner will be followed by the election of officers for 1925.

Prizes and plaques will be distributed at the annual smoker which will be held in the hotel on Saturday night, October 4.

SOCIETY OF AUTOMOTIVE ENGINEERS

The Society of Automotive Engineers will also make its headquarters at the Miami Hotel. The principal meeting will be held Thursday evening, October 2, in the N. C. R. Schoolhouse Engineers' Club.

Places and Things You Will Want To See

ORVILLE WRIGHT MANSION

Orville Wright, "father of the airplane" lives in Dayton, with his sister, Miss Katherine Wright, in a beautiful mansion in Oakwood. The edifice occupies a commanding sight on Harmon avenue and can be distinguished by the high columns facing out across the broad lawn.

THE WRIGHT LABORATORY

Although not actively engaged in the aeronautic industry, Mr. Wright maintains his private laboratory on Broadway, one-half square north of Third street. It is a small, red brick structure, one story, and devoid of indentification marks of any kind. He can be found there most any working day tinkering over a work bench or studying drawings. It calls to mind the old adage: "Art is Long."

OLD WRIGHT WORKSHOP

The old bicycle shop in which Orville and the late Wilbur Wright built many of the models and some of the parts of the first successful airplane, was located at 1127 West Third street. Here it was, also, that the brothers spent their winters evolving new air theories to be put in practice the following spring in tests at Kitty Hawk, S. C., where the first flight was accomplished.

EARLY WRIGHT HANGAR

Of equal importance in aviation history is the dilapidated airplane shelter at Wilbur Wright Field where much early experimental work was carried on following the successful tests in the south. Up until time of preparations for the Air Races it stood nearly hidden by high weeds and appearing to be ready to fall at any moment.

NATIONAL CASH REGISTER

Dayton's greatest industry, which has carried its name to every civilized country on the globe, is the National Cash Register in South Park, founded by the late John H. Patterson. Beginning in a downtown office 39 years ago with a staff of 13 employes, the business has grown until the plants occupy 44 acres of floor space and give 10,000 people employment. Visitors are always welcome at the factory and taken on inspection tours. Frederick B. Patterson, son of the founder and president of the National Aeronautic Association, is head of this enterprise. It is considered the "Model Factory of the World."

NATIONAL MILITARY HOME

Back in the days before the arrival of the airplane and automobile when amusements were not so multifarious, the Soliders' Home at Dayton was considered one of the show spots of southern Ohio. Excursions ran directly into the grounds from near-by cities. Every Sunday was a gala day for the boys in blue who went through the Civil War. Time has wrought no changes on the beautiful grounds and though the popularity is not as great as it was during the heyday of the institution, many find it enjoyable to stroll through the grounds and chat with veterans of three wars who live there.

GENERAL MOTORS RESEARCH

During the World War this was the plant of the Dayton-Wright Airplane Company, which filled a huge government order for De Haviland observation planes. The company turned out its 1,000th ship in July, 1918, and shortly established a production record of 1,000 ships a month. Charles F. Kettering, inventor of the automobile starter, is head of the research laboratories.

DAYTON'S FIRST RESIDENCE

In an excellent state of preservation, the first home in Dayton stands today in Van Cleve Park, a few hundred feet from the original location at Main street and Monument avenue. It was built in 1796, and used as a hotel and army headquarters during the War of 1812. Although in the flood of 1913, the veteran structure was unaffected by the damaging torrents.

continued on page 117

Places and Things You Will Want To See

continued from page 115

ENGINEERS' CLUB

Dayton boasts of one of the finest club buildings for its engineering talent in the Middle West. The structure was erected by Col. E. A. Deeds and C. F. Kettering, who originated the idea of sueh an organization more than ten years ago. Designed after the classical detail of the Georgian pcriod it is an architectural beauty of refined dignity. It is located at Monument avenue and Jefferson street.

MUNICIPAL TOURIST CAMP

This conveniencc, maintained by the city wclfare department, is located in the southern tip of Island Park along the Miami Rivcr. It has won the highest praise from tourists from all over the United States for the thoroughness of its appointments. Kitchens equipped with gas, running watcr, ironing boards, electric washers and stoves are some of the conveniences found at this resting place.

COMMUNITY COUNTRY CLUB AND GOLF LINKS

The late John H. Patterson, president of The National Cash Register Company, gave this beautiful piece of ground to the city that it might be enjoyed by the public free and maintained in all its natural beauty. It is adjacent to Hills and Dales, one of the prettiest spots in Ohio.

OLD COURTHOUSE

The old courthouse, located at Third and Main streets, in the heart of the city, is regarded as one of the finest examples of Grcek architecture in the United Statcs. A drawing of the structure was made by the British Museum of Arts and is now exhibited at the London sanctuary of art. The building was completed in 1850.

WILBUR WRIGHT FIELD

The races this year will be held at Wilbur Wright Field, located northeast of Harshmanville, whieh is considered the largest military airdrome used by the Air Serviee. It is three miles long, one and a half miles wide and comprises approximately 2,000 aeres.

The loeation was seleeted soon after the United States entered the World War as a training ground for Air Service troops. During the period from August, 1917, to the end of the year, 15 squadrons in whieh 5,000 men received instruction in flying and aerial gunning at the station.

In 1920, activities at the field began to pick up again, after the lapse directly after the war ended. The aviation repair depot at Indianapolis was abandoned and the equipment rcmoved to Wilbur Wright Field. Later the government madc the post the eentral supply and repair depot and the headquarters of the field service section, then known as the cost compilation and propcrty maintenanec branehes.

Besides these three important divisions eentralized at Wilbur Wright Field, there is the 88th Observation Squadron, and the 7th Photographic Seetion. The squadron is a self-eontained mobile unit ready for transportation within twenty-four hours to any spot within the fifth army corps arca.

PROPOSED SITE FOR ENGINEERING DIVISION

This is a magnifiecnt field of 5,000 aeres which was bought by public spirited citizens of Dayton and donated to the War Dcpartment. It was reeently aeeepted with profuse expressions of appreciation by President Cooldge and Secretary of War Weeks.

The field is located cast of Dayton on an improved highway, interurban line and two main railroad divisions. It is so situated that the administration building and

MAJOR J. F. CURRY
Commanding Officer, McCook Field.

other important structures will rest on high and commanding positions while the hangars and flying facilities will be down on the lowlands protected from high winds and other destructive disturbanees.

McCook Field, now within a few minutes ride from the heart of Dayton, will be removed to this location and elaborated upon. It is planned to make this division large enough to care for thc experimental work of the army for years to come.

Major General Mason M. Patrick, chief of the Air Serviee, rceommendcd in his annual report that $5.000.000 dollars be set aside for improvement of this landing and establishing the permanent enginecring division upon it. He urged that the work be startcd as soon as possible because of the inadequacy of McCook Field.

The plan to save McCook Field for Dayton and move it to a site made famous in aeronautic history through the experiments of the Wright Brothers thcre, was conceived by the late John H Patterson. After his death the work was undertakcn by his son, Frederick B. Patterson, who carried it through with great success.

THE TRANSCONTINENTAL FLIGHT

Kelly--Macready and the Famous T-2

THOUGH great deeds will continue to be accomplished in the air the final triumph of Lieutenants Oakley G. Kelly and John A. Macready in crossing the continent in the Army Transport T-2 from New York to California without a stop will go down in history as one of the outstanding feats of the age.

One must review the discouraging and nerve-racking experiences of the two unsuccessful attempts, to fully appreciate the character of the men who wrote this line in the annals of human achievements. "Kelly and Macready" represent a team which furnishes an epitome for all of the traits we usually picture in the strong, fearless men of the Air Service.

The Army Transport T-2—most famous veteran airplane in the world. Now on exhibition at the Smithsonian Institute—Washington, D. C.

Thwarted in their first attempt to fly the T-2 from San Diego eastward to Long Island, New York, through the presence of heavy fogs in the mountain passes they remained in the air and dropped the following message over Rockwell Field, the starting point of the flight:

Captain R. G. Ervin,
Commanding Officer, Rockwell Field:

Impossible to get through mountain passes with heavy load on account of dense fog at ground and aloft. An hour and a half wasted in attempting to get through, with no sign of clearing. Cannot now reach high altitude south of Tucumcari, New Mexico, before nightfall. We are attempting to break the world's endurance record for airplanes and will make the transcontinental flight later. Please get in touch with representatives of the N. A. A. and take the steps necessary to authenticate a world's airplane endurance record, should the attempt prove successful, and also wire this information to Commanding Officer, McCook Field.

Macready.

The aviators had begun their flight at 8:30 on the morning of October 4, (1922). They remained in the air 35 hours 18 minutes, establishing a world's duration record, beating the former record held by France by eight hours. This record, however, went for naught as will be seen later.

Again on November 3, (1922), after waiting weeks for favorable weather conditions the two flyers took off from Rockwell Field in the early dawn. This time they succeeded in negotiating the mountains at Temcula Pass, as were also the higher mountains in the vicinity of San Jacino and south of Banning. All went well until the region around Tucson was reached when both rough weather and other flying difficulties were encountered. The graphic accounts written later by the pilots depicting their struggles to surmount the high elevations in this section is like reading a book of fiction. At times they brushed the cactus on the rugged surface and were finally forced to direct their course over the deserted alkali dry lakes and the vast snow-white salt marshes of New Mexico, thence over the Malapals, or ancient volcanic lava beds, which stretched beneath for hundreds of miles like a huge sheet covered with grotesque black tufts and masses. The airplane fairly skimmed the mysterious black volcanic craters, unable to rise higher with the heavy load of fuel. Never before had an airplane passed over this region and the appearance of the T-2 just above the surface of the ground caused great consternation among the Indian tribes living in their mud huts and caves in this barren region of alkali and lava. Finally crossing the divide no more than twenty feet from the surface they travelled on, reaching New Mexico at nightfall where they fought through terrible storms in the inky blackness with nothing to guide them save the course of a railroad and the instinct gained from long experience, in the air. They were obliged to fly so low,

to keep their course, that extreme care and watchfulness were required to avoid hitting farmhouses, trees and buildings.

The pilots say that there are several isolated families in Oklahoma and Kansas whose slumbers were disturbed in the zero hours of the night by the thunder of a powerful motor within a short distance of their roofs. It must have been an impressive moment for those people, so far from the active life of cities and civilization, to hear the tremendous roar, jump to the window in alarm, and see the huge monoplane, with fire spurting from the exhaust stacks pass like a huge dragon out of view in the storm and blackness at a speed of 100 miles an hour.

It was still dark when the lights of St. Louis were passed, the first signs of daylight showing shortly afterwards.

The T-2 had passed through parts of six states during darkness — New Mexico, Texas, Oklahoma, Kansas, Missouri and Illinois.

About fifty miles from Indianapolis a cracked cylinder jacket which has been causing trouble for some hours finally became extremely serious. A forced landing became necessary and by pouring coffee and soup in the radiator the plane was made to keep the air until Fort Benjamin Harrison near Indianapolis was reached where a landing was made by the weary and discouraged pilots.

Lieutenant John A. Macready (left) and Oakley G. Kelly (right) the world famed flying team which drove the T-2 on many a spectacular flight.

Are such men not worthy of admiration and glory when after such an experience we see the two flyers again in the air over Dayton, Ohio, in the T-2 attempting to make another endurance record their former record over San Diego of 35 hours 18 minutes not being accepted through the non-presence of official timers.

This time Kelly and Macready were careful to provide for all official regulations and after three unsuccessful attempts during the winter the pilots got off on April 17, 1923, with the 10,850 pound weight after about a mile run over the ground at Wilbur Wright Field. This was during the dark of the moon and the flyers remained in the air 36 hours 5 minutes, landing at 10 o'clock of the second night by the aid of a searchlight. This broke the world's duration record. Upon landing, the pilots with their usual tenacity of purpose made immediate preparations to fly the T-2 to New York and try for another hop to the Pacific coast.

We read of them leaving Roosevelt Field, Long Island at 12:36 p. m. On May 2, 1923, and after 26 hours 50 minutes of continuous flight; made the 2560 mile journey to Rockwell Field, San Diego.

On this second trip from east to west the pilots passed through parts of seven states at night and were flying in darkness for 13½ hours.

As the flyers upon landing at San Diego gulped down hot coffee from a vacuum bottle filled the previous day in New York they were handed a telegram from the old wagon train pioneer, Ezra Meeker, of New York, which read:

"Congratulations on your wonderful flight, which beats my time, made seventy-five years ago by ox team, at two miles an hour, five months on the way. Happy to see in my ninety-third year so great a transformation in methods of travel. Ready to go with you next time."

* * * *

One hundred eighty gallons of gasoline carried in tank in fuselage—557 gallons in tanks located in wing section—35 gallons of oil constituting a total weight of 4,662 lbs.

Pilot sits high up in nose beside engine. There is another control about 10 feet in the rear; the pilots taking six hour shifts at piloting. On completion of a six-hour turn at the front controls the pilot would signal energetically, by shaking the wheel, for the pilot in the rear "stateroom" to take the controls, and when satisfied that everything was functioning satisfactorily would open the small door to the rear, pull out the back of the pilot's seat, and drop it on the floor through the hole, together with the parachute and cushion. Lifting up one side of the hinged seat, he would crawl through the small door and back through the narrow passageway to the rear pilot. Thus the change at the wheel was made the new pilot taking his position in the front cockpit.

The Army Transport T-2 is now on exhibition at The Smithsonian Institute.

for the man who drives==

There's a wonderful sense of security and satisfaction for the man at the wheel when he can KNOW his running gear is dependable. It is a significant fact that the winning car at the Indianapolis Speedway last Decoration Day was equipped with Dayton Wire Wheels.

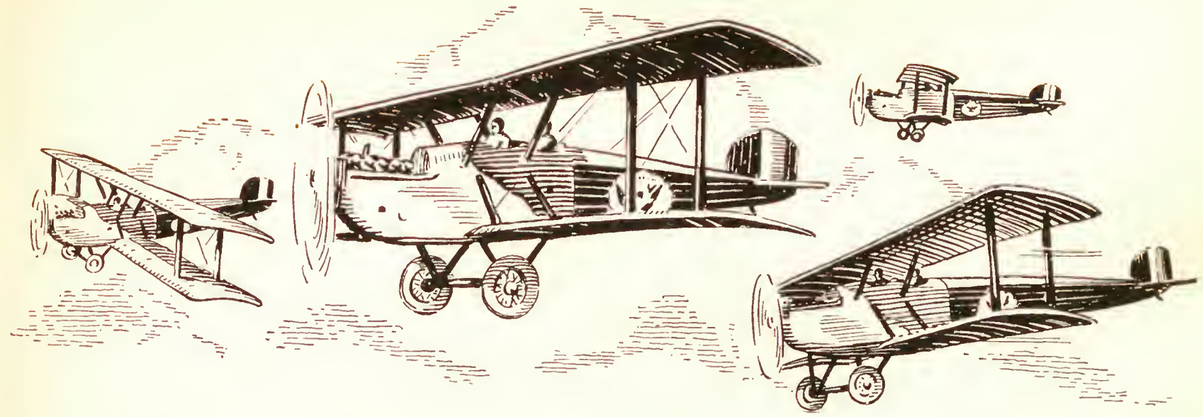
Not once during those gruelling miles did L. L. Corum and Joe Boyer, drivers of the winning car, have to waste a single worry about the wheels on which they were riding. They KNEW their Dayton Wire Wheels would stay with them to the end of the race.

INTERNATIONAL Air Races DAYTON, O. OCT. 2-3-4

A similar sense of security is important to the driver of any automobile, whether it be pleasure or speed car. You can have this assurance with Dayton Wire Wheels.

The Dayton Wire Wheel Co.
Dayton, Ohio

Dayton Wire Wheels
QUICK DETACHABLE



==or the man who flies!

Never before in the history of aviation have men faced hazards equal to those undertaken by the drivers of the "'round the world" planes. America congratulates her intrepid fliers who have circled the Globe with the Stars and Stripes.

While crossing the oceans, their welfare was safeguarded by the navies of the world, but throughout the "cross country" portion of their trip, they depended upon Dayton Wire Wheels to "take the ground" safely. Aviators who have used them KNOW that Dayton Wire Wheels never crush when landing—a point of vital importance.

INTERNATIONAL Air Races DAYTON, O. OCT. 2-3-4

Fliers of tomorrow can have no better assurance of dependability and safety when "taking the ground" than to see that their "ships" are equipped with Dayton Wire Wheels.

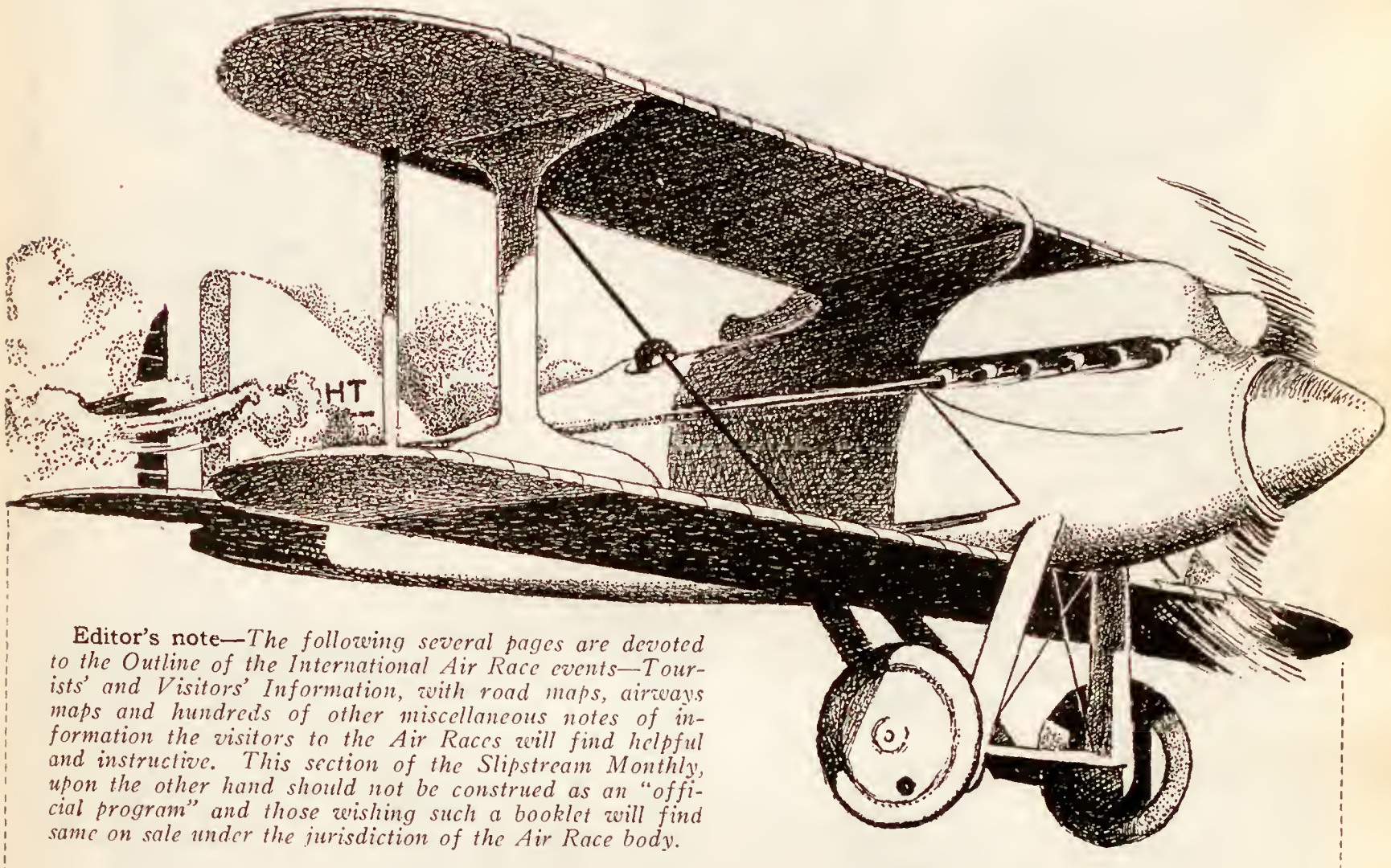
The Dayton Wire Wheel Co.
Dayton, Ohio

Dayton Wire Wheels
QUICK DETACHABLE

OUTLINE OF EVENTS

INTERNATIONAL AIR RACES

DAYTON, OHIO, OCTOBER 2, 3, 4, 1924



Editor's note—*The following several pages are devoted to the Outline of the International Air Race events—Tourists' and Visitors' Information, with road maps, airways maps and hundreds of other miscellaneous notes of information the visitors to the Air Races will find helpful and instructive. This section of the Slipstream Monthly, upon the other hand should not be construed as an "official program" and those wishing such a booklet will find same on sale under the jurisdiction of the Air Race body.*

Condensed List of Events

Preliminary—Awarding of On-To-Dayton Race Trophy and Cash Prize

Thursday, 10:00 A. M., October 2. Free-for-all Two-Seater Low Horse Power Airplanes. 11:30 A. M., Free-for-all Race for Two, Three or Four Place Airplanes. 1:10 P. M., Aerial Carnival. 2:30 P. M., Race for Observation Type (two-place) Airplanes.

Friday, 9:30 A. M., October 3. Mulvihill Trophy Duration Race for Model Airplanes (for juveniles). 12:40 P. M., Dayton Chamber of Commerce Race for Large Capacity Airplanes. 2:30 P. M., Dayton Daily News Light Airplane Race. 3:00 P. M., Aerial Carnival.

Saturday, 10:00 A. M.-11:00 A. M., October 4. Aerial Gymkhana. 11:00 A. M., Speed and Efficiency Race for Light Airplanes. 12:00-1:00 P. M., Grand Review of All Airplanes—also, Military Flying Maneuvers. 1:00 P. M., John L. Mitchell Trophy Race (Military Planes Only). 2:15 P. M., Pulitzer Trophy Race for High-Speed Airplanes. 3:00 P. M., Aerial Carnival.

Aerial Fireworks and Pyrotechnics Each Night Throughout the Program.

Collection of Various Air Race Trophies

1. Detroit News Aerial Mail Trophy. (Not competed for this year.)
2. Dayton Chamber of Commerce Trophy.
3. John L. Mitchell Trophy.
4. Liberty Engine Builders Trophy.
5. Mulvihill Model Plane Trophy.
6. Central Labor Union of Dayton Trophy.
7. Dayton Daily News Trophy.
8. Pulitzer Trophy.
9. Aviation Town and Country Club of Detroit Trophy.
10. National Cash Register Company Trophy.
11. Dayton Chapter N. A. A. Trophy for On to Dayton Race.
12. Engineers' Club of Dayton Trophy.
13. Dayton Bicycle Club Trophy.

SCHEDULE OF AIR RACE EVENTS

ON-TO-DAYTON RACE

For Civilians

Prize—A permanent possession trophy presented to winner by the Dayton Chapter, Natl. Aeronautic Association. In addition cash prize of $3500 in Liberty Bonds.

Competitors in this race can fly any make of plane. Items such as speed, distance traveled, number of passengers carried, horse power of engine, etc., will figure in determining the winner.

Entrants must fly to the races from points beyond a 200 mile radius from Dayton. This race held to influence a great number of pilots to fly in to the races has drawn upon flyers from points far and near, in North America, with some carrying as high as five passengers. Their flights must start after September 20 and finish before the end of the day of October 1.

Entries for the Pulitzer Race

Lieut. H. H. Mills
Wilbur Wright
Field

Lieutenant W. H.
Brookley
McCook Field

Captain Burt Skeel
Selfridge Field

THURSDAY, OCTOBER 2

1 At 10 a.m. **National Cash Register Trophy Race** for two-seater low horse-power airplanes. This event will be held for civilian pilots in competition for prizes totaling $3500 in Liberty Bonds, and a trophy. It will be six times around a closed course of 15 miles, (90 miles).

2 At 11:30 a. m. the **Central Labor Union of Dayton Trophy Race** for two, three or four-place airplanes will be staged. The planes must fly eight times around the closed course of 15 miles. Prizes: $3500 in Liberty Bonds and a trophy.

3 Starting at 1:10 p. m. after this race will be staged an **Aerial Carnival** demonstrating bombing and various battle maneuvers, at the beginning. Following this will be a "Sky-Writing" event in which a pilot will soar to a great height and by the aid of a smoke-making apparatus write huge letters in the sky. These letters are made over a half-mile high and requires specially trained aviators to manipulate the plane in making the letters readable from the ground. Following this there will be an old-fashioned **Free Balloon Flight.** Soon afterwards, the air will tremble with the deafening drone of the great **Barling Bomber—largest airplane in the world,** which will lift gracefully from the field and rumble through the air looking not so much unlike a "box-car on wings." Smaller planes will hover about it like swallows darting about a huge hawk, just to give the spectators a comparison. Following the Barling Bomber Flight a number of pursuit planes will form in battle style just as they do in real warfare in protecting our huge bomber planes while they drop their deadly missiles. Later on, these little pursuit planes will perform all manner of acrobatics in the air, and although entertaining on the surface, are part of the army aviator's training to aid him in eluding the enemy. Then the throng will be awe-stricken by beholding an aviator actually flying upside down.

Of course the **Parachute Jumpers** will be on hand and jump from planes at a dizzy height. Falling like a dead weight for hundreds of feet they will pull the cord which releases the parachute pack which immediately opens and checks the downward plunge of the daring jumpers. These parachutes are made of finest silk and when opened out measure about twenty-four feet in diameter. Although the parachute has saved many a life it is not a "sure" device. Unless conditions are favorable something may prevent the pack opening properly and thus result in a disaster. "Live Jumps" are in the

Entries for Dayton Chamber of Commerce Trophy Race

Captain G. C.
Kenney
McCook Field

Staff Sergeant
L. P. Hudson
Phillips Field

Lieutenant D. M.
Myers
Phillips Field

Lieutenant H. D.
Smith
Langley Field

Lieutenant C. F.
Bond
Phillips Field

Lieutenant Hez
McClellan
Brooks Field

SCHEDULE OF AIR RACE EVENTS

THURSDAY, OCTOBER 2—*continued*

Air Service pilot's training program however, and you will be shown how it is done during the Air Carnival. **The "Smoke Screen"** lately perfected feature in aerial defense will be another attraction. Planes will scatter the chemical compound from a height of about 500 feet. When the liquid strikes the air it drops toward the earth in a light curtain of smoke which in war time is used to obscure objects from the enemy. **Freak Flying** of all kinds with a demonstration of the Curtiss Pursuit will conclude the Aerial Carnival program.

4 Following the Aerial Carnival at 2:30 p. m. the **Liberty Engine Builders' Trophy Race** will be run for observation type two-place military planes. Prizes of $3000 in Liberty Bonds will be given to the first five to complete the race. Distance 180 miles or 12 laps over a 15-mile course.

FRIDAY, OCTOBER 3

1 At 9:30 a. m., the **Mulvihill Trophy** duration race for model airplanes entered by members of the Junior Flying League Branch of the N. A. A. will be staged. Eight prizes totaling $500 will be allotted to the first eight winners. This race is held to stimulate interest of the younger generation in the construction of aircraft design models. These little flying models are made to fly from the power of rubber bands. They are restricted in size to a wing span of forty inches.

2 At 12:40 p. m. the **Dayton Chamber of Commerce Trophy Race** for large capacity planes will take place. This event is open to both civilian and military entrants. The large capacity planes entered in this race must be capable of carrying a pay load of 2000 pounds or over, at a speed of eighty-five miles or over. $4000 worth of Liberty Bonds will be allotted to the first four winners.

3 At 2:30 p. m. the **Dayton Daily News Light Airplane Trophy Race** will be staged. This trophy will be competed for by light "flivver" type airplanes with small horse-power motors. Civilians only are permitted to enter. $3250 in Liberty Bonds will be allotted to the first three winners.

4 After the Dayton Daily News Race an **Aerial Carnival** will start about 3 o'clock. This event will include Aerial Combat demonstrations, Parachute Jumps, Pursuit Formations, Free Balloon Flight, Sky-Writing, Freak Flying, Refueling-in-Air demonstration, Fancy Flying, etc.

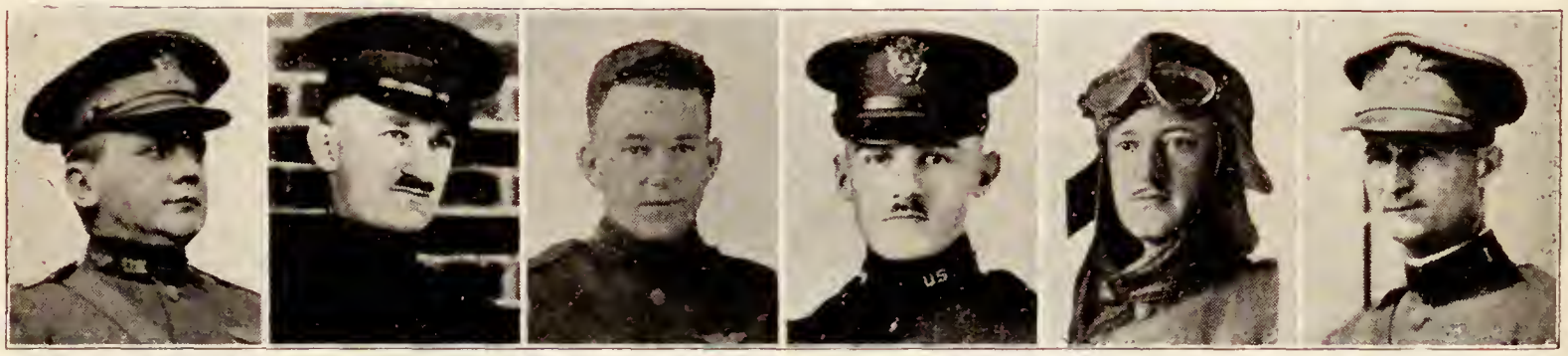
SATURDAY, OCTOBER 4

Note—(Detroit News Air Mail trophy race eliminated.)

The last day's events will start at 10:00 a. m. with an "Aerial Gymkhana" in which the racing military pilots will hold a contest in fancy, and exciting feats. Each pilot will perform stunts of the kind he is most proficient and give the spectators some real thrills. Between 12 o'clock and 1 o'oclock all types of airplanes at the races will parade on exhibition before the grandstand. Possibly the "Round-The-World" Cruisers with the pilots will be included in this parade.

1 At 11 o'clock the Speed and Efficieny Race for Light Airplanes flown by civilians will be staged. For the winner in speed the **Dayton Bicycle Club** will give a

Entries for Liberty Engine Builders' Trophy Race



Lieutenant A. E. Simonin, Moundville, Md.

Lieutenant Rex K. Stoner, Langley Field

Lieutenant D. G. Duke, O. C. A. S.

Lieutenant E. B. Bobzein, Chanute Field

Lieutenant Col. H. E. Hartney, Dayton Reserve Officer

Lieutenant L. V. Beau Jr., Bolling Field

Lieutenant C. A. Cover, Wilbur Wright Field

Lieutenant L. A. Walthall, Fort Bragg

Lieutenant C. W. Steinmetz, Bolling Field

Lieutenant J. B. Haddon, Brooks Field

Lieutenant R. J. Brown Jr., Boston, Mass.

Lieutenant R. D. Knapp, Maxwell Field

Major C. L. Tinker, Fort Riley

SCHEDULE OF AIR RACE EVENTS

SATURDAY, OCTOBER 4—*continued*

trophy while the **Dayton Engineers' Club** will present a trophy to the winner in efficiency. In addition to these trophies there is a total of $5000 in Liberty Bonds which will be allotted to the four pilots making the highest efficiency features. This will be determined by dividing the miles per hour speed by the amount of fuel consumed. A bonus for each cubic inch engine displacement less than eighty will be given the pilots finishing first, second, third and fourth in the speed contest. The planes will fly a distance of fifty miles which means ten times over a five mile course.

2 In the afternoon at 1:00 p. m. the **John L. Mitchell Trophy** for pilots of the First Pursuit Squadron of the Army Air Service, will be staged. The planes of the pursuit type will fly four times around a closed course of 31.07 miles.

Trophy cups will be awarded by Brigadier General William Mitchell, Assistant Chief of Air Service, in memory of his brother killed in the great war, to the first three winners. The event is a closed event for pilots of the First Pursuit Group.

3 At 2:15 Saturday afternoon the **Pulitzer Trophy Race**—the speed classic will take place. This race is the most spectacular event of the International Air Races. This trophy has been competed for since 1919 in which year an insignificant contest was staged and the trophy awarded to a Canadian who had fought with the R. A. F. in the World War. The first official contest for the Pulitzer trophy was held in 1920 in races at Long Island and was won by Lieutenant C. C. Moseley. now commanding officer of Clover Field, Santa Monica, California. He flew the Verville-Packard plane at a speed of 156 miles an hour.

The following year Bert Acosta won the trophy with a Navy Curtiss Racer at Omaha, making a speed of 176 miles per hour.

In 1922 with an Army Curtiss, Lieutenant Russell L. Maughan won the trophy race at Detroit with a speed of 205.8 miles per hour Last year at St. Louis, Lieut. Al. J. Williams, U. S. N., drove a Navy Curtiss Racer at a speed of 243.68 miles per hour and now possesses the trophy.

Planes entering this contest must be of single seat type with a speed of not less than 175 miles per hour and a landing speed not to exceed 75 miles per hour.

The Navy is not participating in this year's races. Lieutenant Alex Pearson, of the Army Air Service, who was expected to win the 1924 event was killed during speed trials several weeks ago. The Curtiss Racer was also completely wrecked.

Prizes totaling $10,000 in Liberty Bonds will be shared by the first four winners. First prize $5000.
The planes will fly 124.27 miles over the 31.07 course.

4 An Aerial Circus will furnish a conclusion to the Air Race program.

Entries for John L. Mitchell Trophy Race

Lieutenant H. R. Yeager
Selfridge Field

Lieutenant E. C. Whitehead
Selfridge Field

Lieutenant D. F. Stace
Selfridge Field

Lieutenant J. T. Johnson
Selfridge Field

Lieutenant T. W. Blackburn
Selfridge Field

Lieutenant J. D. Summers
Selfridge Field

Lieutenant T. K. Matthews
Selfridge Field

Lieutenant Cyrus Bettis
Selfridge Field

? DO YOU TAKE ? THIS MAGAZINE ?

FRED F. MARSHALL,
Editor and Publisher of
Slipstream Monthly

IS there anything more interesting than the romantic stories centering about the progress of aviation—for instance, The Round-The-World-Flight—The Parachute Jump of Lieutenant Macready in the black night—The Wild Midnight Ride of the giant dirigible "Shenandoah"—The Coast to Coast Flight of the T-2, etc.

This magazine published in the dooryard of the Airplane's Birthplace brings these stories to you well illustrated with authentic views.

Slipstream Aviation Monthly is moderately priced to induce you to subscribe for it and thereby enroll you as another staunch advocate to the cause of aeronautical development.

On the Air Race grounds you will find our headquarters where you may call and place your subscription or otherwise mail the attached subscription blank properly filled out with your remittance to our Dayton headquarters.

DO IT NOW—WHILE THE SPIRIT MOVES YOU

SUBSCRIPTION BLANK

Slipstream Publishing Company,
401 Beckel Bldg., Dayton, Ohio.

Gentlemen:

Please enclosed find (Draft) (Check) (Money Order) to the amount of two dollars ($2.00) which entitles me to one yearly subscription to the Slipstream Monthly beginning with the..... issue.

Name .....

Street & No. .....

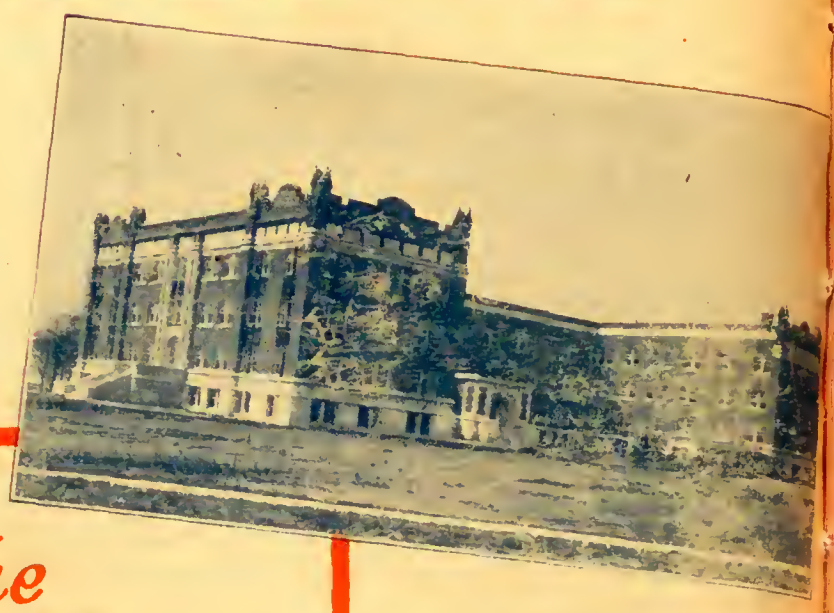
Town .....

State .....

THE OTTERBEIN PRESS, Dayton, Ohio

CHADWICK HEIGHTS

Jefferson School adjoining Chadwick Heights



U. B. Seminary near Chadwick Heights

The BEST NEW SUB-DIVISION

CHADWICK HEIGHTS

Chadwick Heights is a beautiful sub-division of 120 acres—a tract large enough to create a new district, located in the northwest part of Dayton View, the principal streets being Princeton Drive, Cornell Drive and Catalpa Drive extended. The property is being developed with wide curved avenues and numerous parks, with sidewalks, curbing and gutter, city water, sanitary sewer, gas and electricity.

The property is protected with reasonable restrictions, adequate but not burdensome, but with a look toward the future where a home can be built with full confidence.

The natural forest trees with the rolling lay of the land make the plat very interesting and pleasing.

See Chadwick Heights

Picture of the Plat of the City of Dayton, reduced, showing size and location of Chadwick Heights

Chadwick Heights is a residential district, high dry and healthful. The soil is fertile, affording opportunity for beautiful lawns and garden spots. The drainage is perfect having plenty of fall and a gravel subsoil. From the home owner's standpoint the property has an ideal location, being to the north-west-ward of the city and near the U. B. Seminary Buildings and Campus. It enjoys an intellectual atmosphere on this account and is a location for the better class of homes.

Whether you pay cash or prefer to buy on payments, the restrictions and good surroundings assure good buildings and a rapid increase in value.

Visit Chadwick Heights

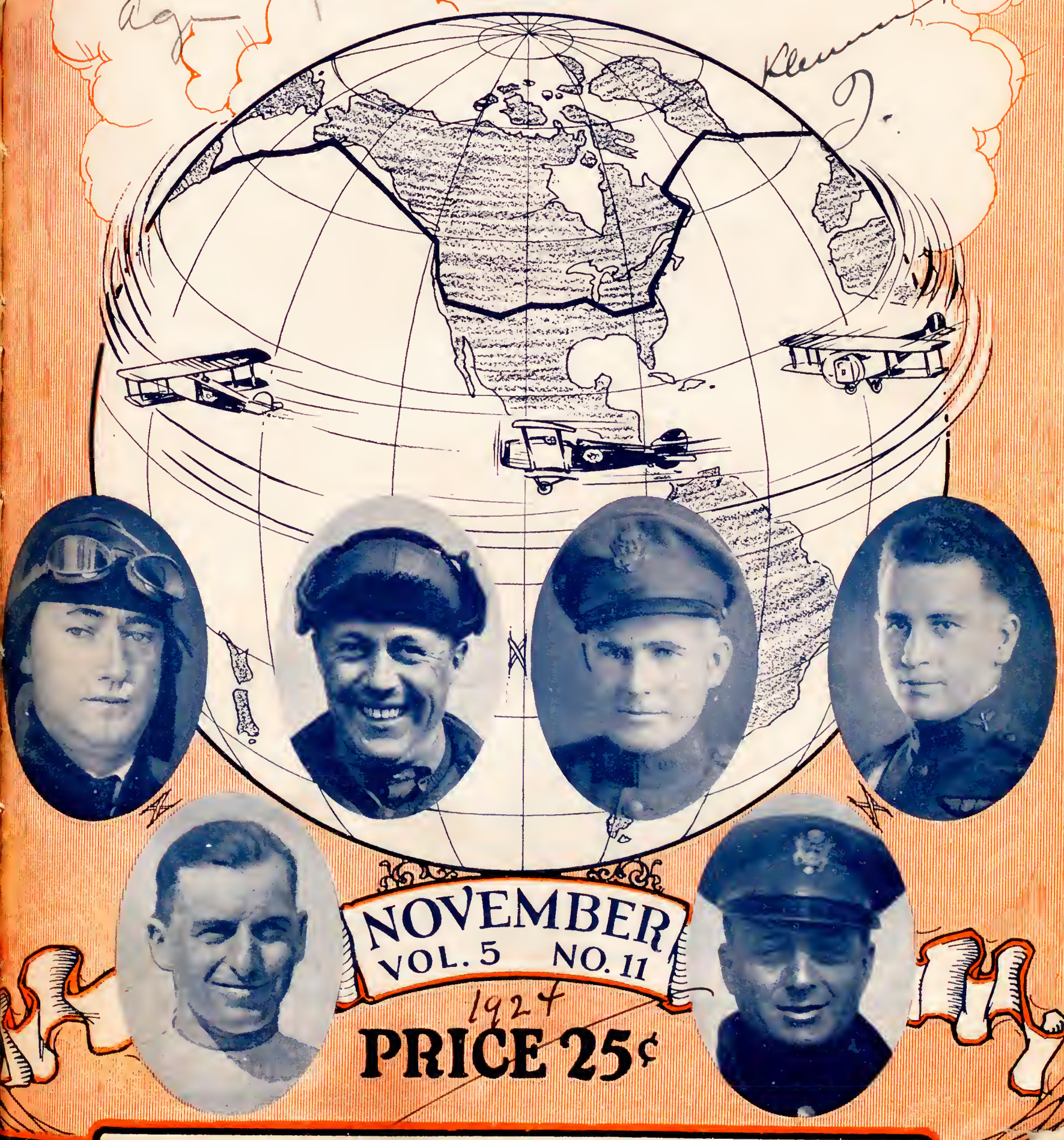
George H. Snyder Realty Co

126 N. Main St. Dayton Ohio. *Main 1904*

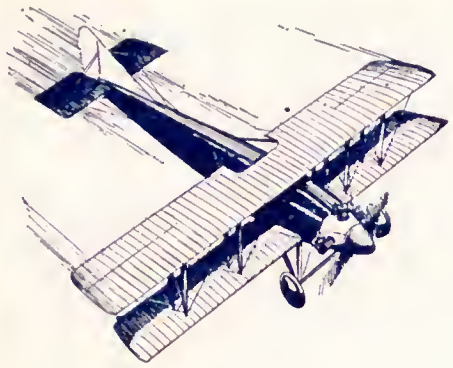
Call us for appointment to inspect, prices, etc.

SLIPSTREAM

WORLD FLIGHT EDITION



NOVEMBER
VOL. 5 NO. 11
1924
PRICE 25¢



The New Velie

AIRPLANE SIX

A Motor Sensation!

The 1925 Velie line, with the New Airplane type motor, is now on display.

It is a marvelous car—new and distinctive body lines—beautifully finished. Balloon tires—Hydraulic Four Wheel Brakes—and amazingly small prices.

A leading feature of the new Velie line is the Coach-Sedan—Velie's greatest triumph, richly finished and upholstered, and equipped with Disc Wheels, Full Size Balloon Tires, Lockhead Hydraulic Four wheel Brakes—the only enclosed car of equal quality to sell around $1530 delivered here.

See these new, big, impressive powerful Velie models. Visit our showrooms.

Get the thrill of first hand revelation of the new Airplane Type Velie built motor.

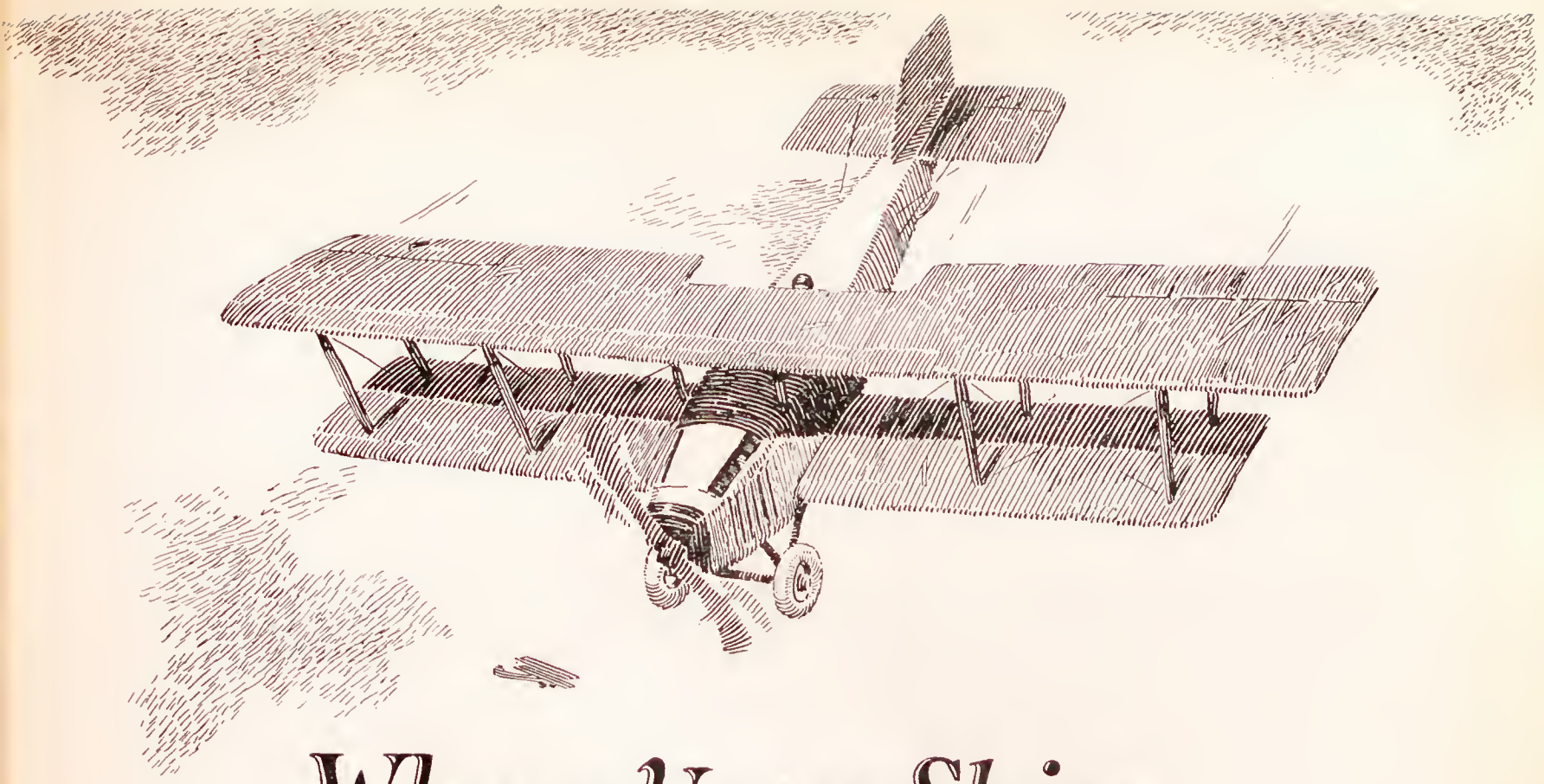
It will prove a sensation!

Dayton Motor Sales

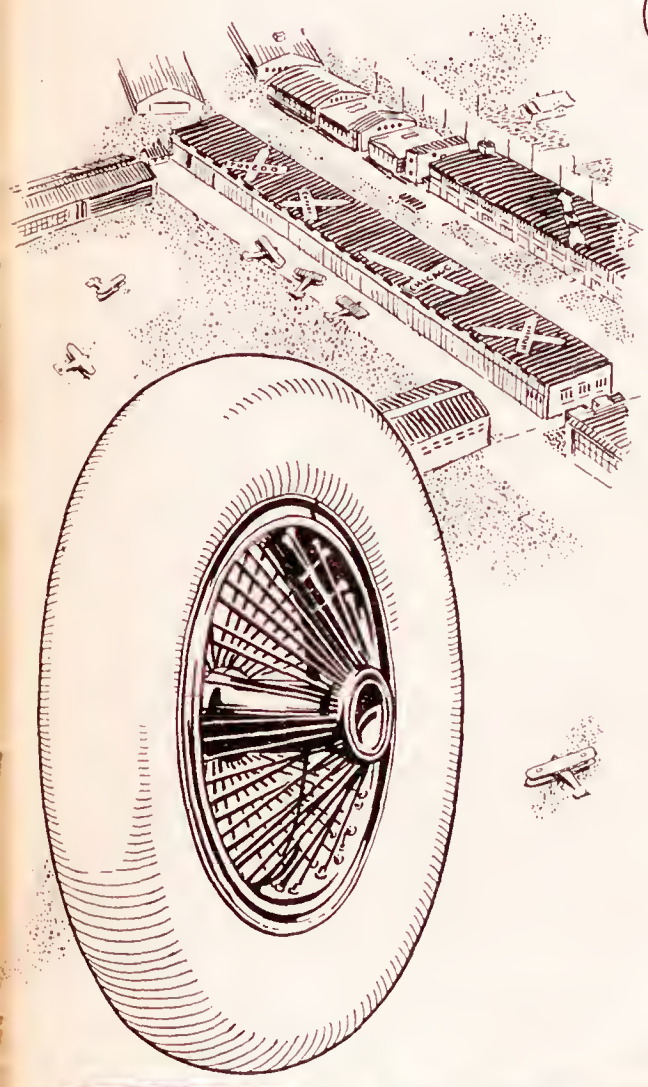
Main 3085 **220 North Main St., Dayton** **Open Evenings**

$1530
Delivered Here

4 Wheel Hydraulic Brakes with Disc Wheels and Full Balloon Tires



When Your Ship Glides to Earth



Not all the anxiety of flying is confined to the air. Many an aviator has had an anxious moment when he prepared to land. "Will my running gear stand the shock if I should hit the ground too quickly? What if my wheels should crush?"

The popularity of Dayton Wire Wheels is evidence of their uniform dependability. Repeated tests have demonstrated their sturdy stability. They do not crush—and the answer is in the way they are made.

For the sake of safety to both flyer and craft, be sure that your ship is equipped with Dayton Wire Wheels.

The Dayton Wire Wheel Company

Dayton, Ohio

"For the Man Who Drives or the Man Who Flies"

Dayton Wire Wheels Were Used on the World Cruisers

Dayton Wire Wheels

QUICK DETACHABLE

Slipstream

SLIPSTREAM—The stream of air driven aft by the propeller.

VOL. 5 NOVEMBER No. 11

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879.

SUBSCRIPTION RATES:

One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL____Editor CARL SANDSTROM____Advertising Manager

CONTENTS

ITINERARY OF WORLD FLIGHT

March 17—Santa Monica-Sacramento (350). *March* 18—Sacramento-Eugene (375). *March* 18—Eugene-Seattle (240). *April* 6—Seattle to Prince Rupert, B.C. (650). *April* 10—Prince Rupert to Sitka, Alaska (300). *April* 13—Sitka to Seward, Alaska (600). *April* 15—Seward to Chignik, Alaska (450); the "Seattle" (Major Martin) forced down at Kanatak with a leaking crankcase. *April* 17—Chignik to Dutch Harbour, Unalaska (400). *April* 25—'Plane "Seattle" flew from Kanatak to Chignik. *April* 30—'Plane "Seattle" left Chignik for Dutch Harbour, but crashed into mountain. Crew saved and walked to Port Moller, arriving ten days later. *May* 3—Three remaining 'planes, "Boston," "Chicago" and "New Orleans," flew from Dutch Harbour—Nazan (Island of Atka) (350). *May* 9—Nazan-Chicagoff (530). *May* 16—Chicagoff-Komandorski-Kashiwabara Bay, Paramushiru (900). *May* 19—Paramushiru, Hitto Kappu Bay-Yetorofu (510). *May* 22—Yetorofu-Minato-Kasumiga Ura (780). *June* 1—Kasumiga-Ura-Kiushimoto (350). *June* 2—Kiushimoto-Kagoshima (380). *June* 3—Kagoshima-Shanghai. 'Planes "Boston" and "New Orleans" (610). *June* 4—Kagoshima-Shanghai. 'Plane "Chicago." *June* 7—Shanghai-Amoy (555). *June* 8—Amoy-Hong Kong (300). *June* 11—Hong Kong-Haiphong (500). *June* 13—Haiphong-Tourane (395). *June* 16—Tourane-Saigon (530). *June* 18—Saigon-Bangkok (675). *June* 20—Bangkok-Tavoy-Rangoon (450). *June* 25—Rangoon-Akyab (445). *June* 26—Akyab-Calcutta (400). *July* 1—Calcutta-Allahabad (475). *July* 2—Allahabad-Umballa (530). *July* 3—Umballa-Multan (325). *July* 4—Multan-Karachi (475). *July* 7—Karachi-Charabar (330). *July* 7—Charabar-Bendar Abbas (330). *July* 8—Bendar Abbas-Bushire (400). *July* 8—Bushire-Bagdad (455). *July* 9—Bagdad-Aleppo (480). *July* 10—Aleppo-Konia-Constantinople (585). *July* 12—Constantinople-Bucharest (290). *July* 13—Bucharest-Budapest-Vienna (650). *July* 14—Vienna-Strasbourg-Paris (650). *July* 16—Paris-London (225). *July* 17—London-Brough (155). *July* 30—Brough-Kirkwall (370). *August* 2-5—Kirkwall-Reykjavik (825). 'Plane "New Orleans," Lieut. Wade, down off Iceland. *August* 21—Reykjavik-Frederiksdal-Ivigtut (900). *August* 31—Ivigtut-Indian Harbour, Labrador (520). *September* 2—Indian Harbour-Hawkes Bay, N.F. (130). *September* 3—Hawkes Bay-Pictou, N.S. (455). *September* 5—Pictou-Casco Bay (410). *September* 6—Casco Bay-Boston (210). *September* 8—Boston-New York (200). *September* 9—New York, Washington (200). *September* 13—Washington-Dayton (420). *September* 15—Dayton-Chicago (294). *September* 17—Chicago-Omaha (440). *September* 18—Omaha-Muskogee (440). *September* 19-20—Muskogee-El Paso, Tex. (880). *September* 21—El Paso-Tucson, Arizona (300). *September* 22—Tucson-San Diego (375). *September* 23—San Diego-Santa Monica (120). *September* 25—Santa Monica-San Francisco (300). *September* 27—San Francisco-Eugene, Oregon (450). *September* 28—Eugene-Seattle (250). The "grand total" figures are as follows:—Total elapsed time, 175 days; mileage, 27,534; days actually in the air, 66; actual flying time, 351 hrs. 11 mins.; average speed, 76.36 m.p.h.

THE GREAT ADVENTURE

Complete Story of the Round-The-World Flight

Preliminary Preparations and Auxiliary Agencies

NOW that the Flight of the Age—The Great Adventure of the Twentieth Century has been successfully consummated the public will welcome a complete review and story of the great undertaking with much interest.

THE successful airplane cruise of the six American aviators in circumnavigating the globe is bound to be marked as singularly epochal in history. As far back as history goes the high lights of navigation have received prominence because such events more than anything else, contributed to the progress of civilization. Thus we are given intimate chronicles of those early voyages made by the Norsemen, by Columbus, by Magellan, by Drake and many others. Each daring cruise of these early seafarers has had some particular important bearing on the events which followed in the advances of civilization.

So unless there is a complete reversion in the evolution of transporting vehicles and the events which have had a bearing upon it, air voyages to the far flung nooks and crannies of the earth's surface will soon be a common thing—in fact, the accepted mode of travel, and peoples of these various regions will be brought into a closer bond of relationship and understanding. Then more than now, perhaps, the Round-the-World Flight and the names of the brave men who carried it through to success will be accorded the honor they justly deserve.

At the beginning of our story of this great flight we feel it is only just for us to bring out a number of factors which contributed largely in the success of the undertaking which might otherwise be overlooked or underrated later in our enthusiastic praise of the flyers themselves. Of course, nothing we can say will detract from the well-deserved praise due the pilots and mechanics who drove their planes over almost unsurmountable barriers, both natural and physical, to accomplish their objective, but it will, perhaps, direct a deal more of credit to those big, he-men who were given the obscure but all important duties "behind the scenes." There were quite a number of these men and had they not fulfilled their missions at the cost of great hardship and privation the flight would certainly have resulted in miserable disaster at the very offset, and sympathy for aviation retarded not a little by the failure, not to mention the sorrow in the loss of the flyers themselves.

We will outline first, the work of the advance officers—the men who were sent out by the Government to blaze the trail for the flyers over the various divisions of the route, which traversed some of the most forbidding and barren places on the entire earth. These men had a big job on their hands and they knew they would get little or no recognition for their efforts so far as the public was concerned. They were playing the second fiddle.

There was Lieutenant Clayton Bissell, who was selected as advance officer for the first division of the proposed route. This officer journeyed far up into the Arctic as far as the Island of Attu in the Aleutian group stretching far out into the bleak, dreary wastes of the Northern Pacific. Without scheduled transportation Lieutenant Bissell traversed hither and yon about this ice-bound region, made arrangements at the different points where the planes were expected to stop, preparing for their care and for the comfort of the flyers, sought out the most suitable landing places, instructed and trained men at these points to care for the ships, made photographs and sketches of land bases and harbors, took notes on prevailing wind directions, checked up on obstructions in the water, shallows, strips uncovered at low tide, stationed anchors to floating buoys, built emergency rafts, appointed representatives at each station and left in their care a complete report for the commander of the flight to aid him in continuing on the next lap of the journey without mishap.

Identified with Lieutenant Bissell in similar advance work is Lieutenant Clifford C. Nutt who paved the way for the flyers over the second division of the route from the Isle of Shimushu in the Kurile Islands of Japan to Chemulpo; Lieutenant Malcolm S. Lawton of the third division from Tsingtau, China, to Calcutta, India; Lieutenant Harry A. Halverson of the fourth division from Calcutta to St. Stefano, Turkey; Major Carlyle H. Walsh of the fifth division from St. Stefano to London, England, and Lieutenant Clarence E. Crumrine and Lieutenant Schultz of the sixth division from London across the northern Atlantic via Iceland and Greenland to America and through the remainder of the flight. There was scarcely any choice in the respective sections designated for each advance man. Each one had his individual diffi-

A group of Air Service officials going over the proposed route of the World Flight at Washington, several months before the start of the journey.

culties to overcome either in the torrid heat of the tropical sun or in the frigid blasts of the Arctic squall. The manner in which they carried out their work without hope or wish of personal glory lends to them an admirable if less popular place on the honor roll of this epochal cruise of the age. We might include with these men the names of those who supervised the various phases of work in connection with the flight from the home bases—the men who looked after the shipment of supplies, the mechanics who so carefully and efficiently overhauled the lot of Liberty motors to be sent to the various supply stations. Certainly, without this well-perfected and enthusiastic organization the flight could not have been so completely successful.

Next, we will turn to those brave fellows of the coast guard, the U. S. Navy, and fisheries service who weathered the treacherous "willi-waws" of the Arctic seas to assist the flyers on their way through the uncharted skies. They carried fuel and supplies to them and kept up that bare thread of communication to the little havens of shelter and safety which meant the only hope of rescue to the airmen in case they were forced down or became lost in those little-traveled regions of the far north. A story of any phase of the struggles of the flyers in crossing the north Pacific and Atlantic is incomplete without some reference to the cordial spirit of cooperation, and good fellowship that existed among these auxiliary agencies. In the north Pacific the *Haida* and the *Algonquin,* vessels of the Bering Sea Patrol together with the *Pope,* the *Hull,* the *Ford* and the *Bear* spared no trials and hardships in lending assistance to the World Flight organization. In addition to the services mentioned they rendered valuable help to Major W. R. Blair of the Signal Corps who was designated for the very important mission of meteorologist in this dangerous division of the route. There was also the *Eider,* an 88-foot boat owned by the Bureau of Fisheries which aided Major Blair in checking up on the weather conditions on the route—a vital factor in the ultimate victory over the elements which were always in a more or less adverse mood in this dreary land. Flying conditions were never good at their best and actual blizzards or hurricanes were not encountered at the time of take-off the men started out relying upon their own flying skill and the advice of the meteorologist who furnished data on the weather over the lap to be flown. Planes

were refueled and repaired in driving winds that carried either rain or ice-cold spray with them. Temperatures were never above the freezing point. Hops of seven or eight hours were often made in rain or spray-soaked clothing, but the weather man knew just about what the planes and flyers could go through and warned the commander accordingly. The *Eider* journeyed twice across the Bering Sea from Unalaska with Major Blair to keep the flyers familiar with weather conditions and to carry supplies to them. The bravery and willingness of the crew of ten men on this little vessel is well worthy of special mention. In connection with the activities of the *Eider* we quote the following brief excerpt from Major Blair's report to the Chief of Air Service:

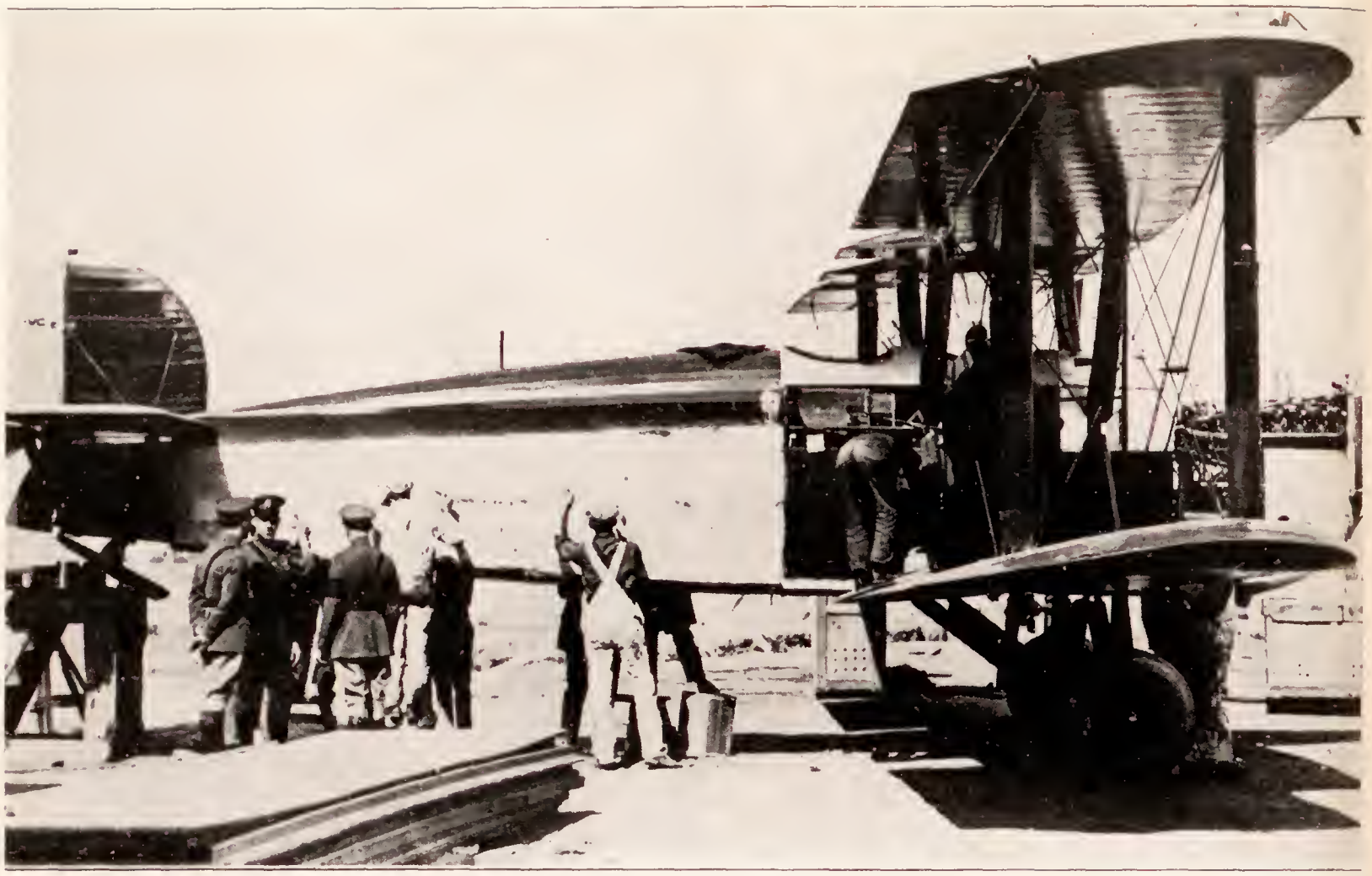
"During the morning the Eider put out moorings for the planes and was ready shortly after her arrival at Atka to start for Chicagof Harbor, Attu Island. Under favorable weather conditions this Eider can make eight knots per hour. On these occasions there were exceedingly high winds. The Eider arrived at Attu between 3 and 4 o'clock on the afternoon of May 6. The gale was terrible and the sea running high. Entering the harbor at Attu under such conditions is a difficult undertaking and a dangerous one because of the rocky condition of the harbor entrance. Most skippers would not have attempted to enter the harbor at the time but we had to be there or fail the flyers and Captain Bock of the Eider feeling confident of his knowledge of the harbor made for the inside anchorage under full speed. This was the only way to go in under the conditions prevailing and the successful entrance to the harbor was a tribute to the nerve and skill of the skipper and crew. It felt fine to be at anchor in a quiet harbor after 1000 miles stormy travel across the Bering Sea."

But the help of these ships was not limited to such work as fueling and carrying supplies to the flyers. Whichever ship was present at the time furnished a rendezvous for all persons connected with the flight. The hospitality was tendered in the best of spirit. The acquaintances formed, and good fellowship enjoyed in comfortable ward room or cabin will long be remembered as the more pleasant reminiscences of the World Flight. The care the flyers received by such agencies throughout the flight accounts for the excellent physical condition of the men at the finish. There were good, wholesome meals, in the far north, games, music, movies and story telling, while the radio buzzed off meagre messages from the relay stations along the coast which connected with the outside world and home.

The editor of *Slipstream* lately came into possession of a weather worn copy of the mimeographed daily paper published on the little *Eider* for the entertainment of the crew. The paper is printed under the name of "Jazzette" and the adventuresome care-free spirit of the crew is well displayed in the unique accounts of their experiences on the high seas. The "Jazzette" gives lengthy mention of the *Eider's* operations in connection with the World Flight and we will quote a few paragraphs from the stirring story related by the crew when they were called upon to put in at Nickolski Harbor, a Russian outpost in the north Pacific. The story, in part, runs thus:

"The Eider was short of water and we was drinking gasoline. It wasn't bad—they drink worse than that at Unga. It was extra quality gas—very concentrated. Just then a summer snow storm came along and before we know it we is drove into Roosia by the weather.

The Douglas World Cruiser, built by the Douglas Company, Santa Monica, California, and selected as the best fitted type for the 27,000 mile trip around the world.



The Douglas Company plant was kept going at double time in order to get the four ships completed and ready for the start of the flight. Although the work was rushed the planes were delivered without a single fault in their make-up which speaks well for the efficiency and character of the manufacturers.

We went into Niekolsky and anchored. Said we wanted water. We wus weleomed by the Bullsheveekee by being told to 'Getski the Hellski Outski.' The odds was awful. There was a Roosian gun-boat in there with three two-hundred and fifty pounders on board. All three of them had whiskers. The Roosians suggested that we leave. Then I eomes to life, I points to the gasoline drums on deek and I says over radio, see them, them's bombs,—lay off, or we will blow up your whole villich. It worked. Brave,—? Oh no, just taeked, that's all."

Again we come across the following account in the "Jazzette" which gives us a little insight of things which happened while the flyers were taking quarters on board the *Eider*:

"It was at this time that things was at there darkest. It was midnight and hope was almost gone for the planes whieh were bobbing up and down like eorks and threatening any minute to go on a little journey of their own and play among the pebbles along the shore. The aviators, plum give out, slept in their flying suits and as the snow siluntly fell on the decks they wondered who suggested flying around the world, anyhow. But grim determination won out. It was then that Harding made his world famous remark as he slept, 'There is only two seasons in Alaska, this winter and last.' All of them aviators was thinking of mother with the exeeption of four which wus thinking of movie aetresses."

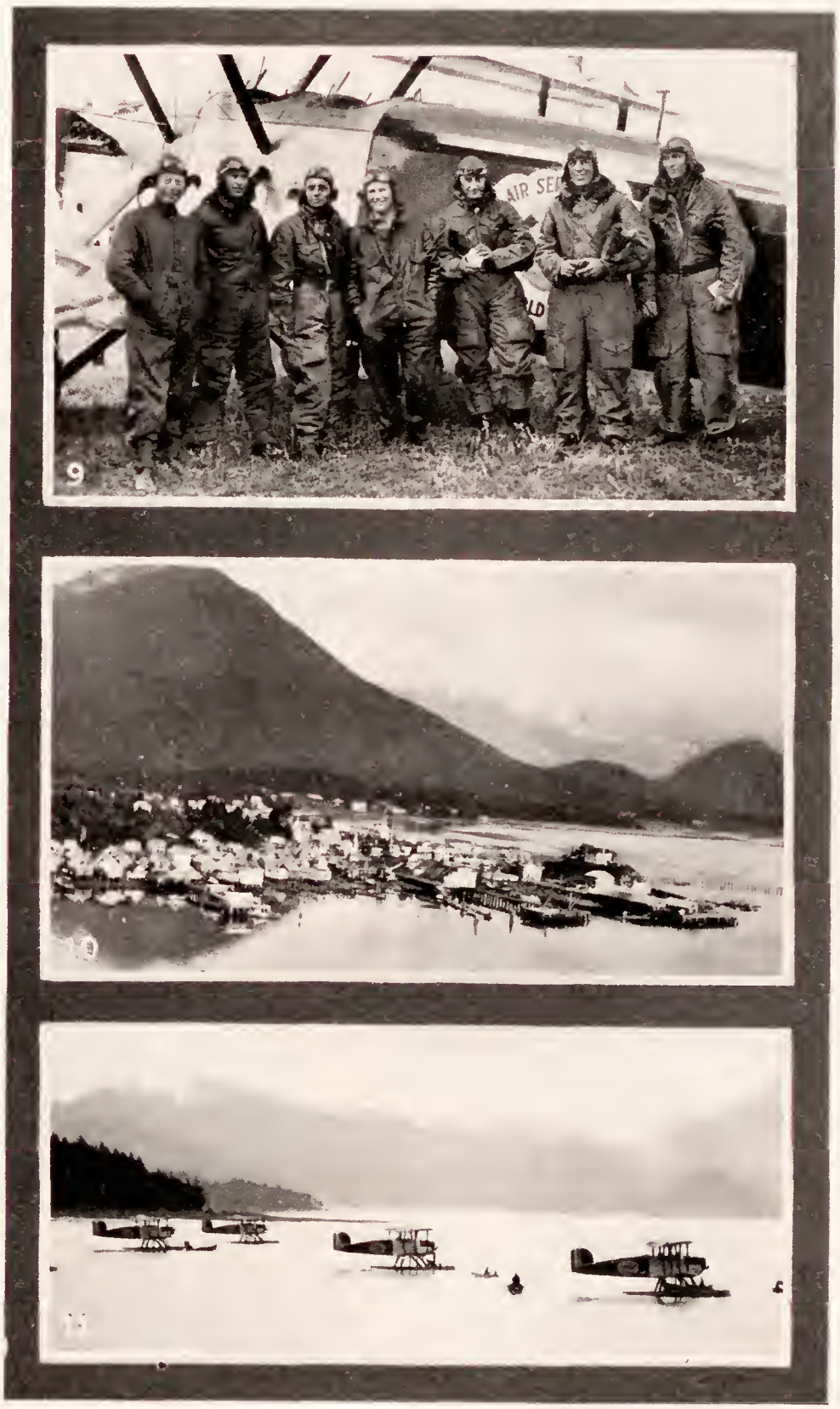
But we must leave the columns of the "Jazzette," with its unique wit and stories between the lines to say a word for the seamen who assisted the flight in the north Atlantic where almost equally bad conditions were met. There was the cruiser *Richmond*, the *Gertrud Rask*, the *Milwaukee* and the *Billingsley* who stood by along the treacherous route in the neighborhood of Iceland and Greenland. The ice floes were coming down unusually early and it was a trying task for the smaller vessels to make their way through the ice-choked waters. Many times with fuel running low and the deadly ice threatening to close in upon them these ships stuck to the job and saved the day for the world flyers. Had they failed to accomplish what they were set out to do the flight would have been held up until the summer of 1925 and the glory of the globe circling journey, although carried through successfully would have been destroyed almost completely by the delay. Incidentally it was the *Billingsley* who rescued Lieutenants Wade and Ogden from the disabled *Boston* after they had been picked up by an English trawler, while the *Richmond* rescued the Italian party headed by Lieutenant Antonio Locatelli which had drifted helplessly in the open sea for forty hours after they had been forced down in their attempt to accompany the U. S. flyers from Iceland to the American mainland.

Thus, too much cannot be said for the men of the sea who gave so willingly of their services in behalf of the men who were braving dangers even greater than they for the sake of a cause which held an equal value to all peoples of the earth.

The Douglas World Cruisers, Plans, Shipment of Supplies

AN airplane flight around the world was a project which had been entertained both in the U. S. Air Service as well as in aviation circles in other countries for several years prior to 1923. The U. S. Air Service regarded the plan with a bit more of conservatism than some of the other nations who did not seem to comprehend the stupendous aspect of such an undertaking should it have a reasonable chance for success.

Once the plan was finally taken seriously officials at Washington went about outlining all phases of the proposed flight in systematic manner. Various veteran flyers in the service were called upon to submit data and suggestions for the flight and among these were Lieutenant C. E. Crumrine, Lieutenant St. Clair Streett and Lieutenant Eric Nelson, all three of which men were members of the famous Alaskan expedition and acquainted with conditions while flying over strange territory. The latter officer, well known for his engineering ability was designated to investigate the qualities of several types of plane under consideration for use on the proposed World Flight. After various designs were thoroughly studied Lieutenant Nelson was finally sent to Santa Monica, California, to the plant of the Douglas Company to examine a new type of "World Cruiser." This ship, a strongly built biplane of 50-foot wing span and built around the famous Liberty-12 motor was at once found admirably adaptable to the unusual requirements demanded for the World Flight. It would carry a useful load of over 2,500 pounds and make a high speed of 100 miles per hour with a landing speed of no more than 55 miles per hour. It had also arrangements for attaching either landing wheels or water pontoons which had a distinct advantage over a clumsy amphibian design. The fact that the plane was of American make was also a point in its favor. In the early part of 1924 the Douglas Company delivered the first of the five World Cruisers contracted for by the Government to McCook Field, Dayton, Ohio, the Army Air Service Experimental Station, where the ship was tested as a land plane and fitted with special navigation instruments, etc., for use later in training the flight personnel for the hazardous journey. The first World Cruiser was sent after tests at McCook Field to Langley Field where the flyers were to go through a course of training in air navigation.



The above illustrations, sent down from Alaska by a member of the World Flight crew during their sojourn in this region give one an idea of the picturesque but dangerous territory over which they were forced to fly and under the most trying weather conditions.. The top picture shows the last group picture of the flyers taken several days before the crash of Major Martin.

Shortly before the training ship was sent to Langley Field the roster of the flyers who were to take charge of four ships was made known. It was as follows:

Ship No. 1 (later christened the Flagship, Seattle) —Pilot and Flight Commander, Major Frederick Martin; mechanic, Sergeant Alva L. Harvey.

THE ROUND-THE-WORLD FLIGHT AT A GLANCE

Above you have a general view of Clover Field, Santa Monica, Calif., just as the first plane piloted by the Flight commander, Major F. L. Martin, was taking off on the start of the flight around the world on March 22, 1924.

Above you see the two remaining planes in the U. S. Round-the-World Flight with the "Boston II" which joined them in Maine, settling on the surface of Boston Harbor as they arrived there to change from pontoons to wheeled landing gear before proceeding on to New York and thence across the continent to the Pacific Coast, completing their flight during which they have girdled the globe. Left to right: "Boston II," the "Chicago," and the "New Orleans."

A photo showing the "Chicago," piloted by Lieutenant Smith, arriving at Mitchell Field after its flight from Boston.

Above is the "Chicago," piloted by Lieutenant Smi taxiing into Mitchell Field where they were greet by a crowd of 100,000 people. Note the landing cre halting the plane while the propeller was still spinni

To the left are the Round-the-World Flyers with their commander, General Mason L. Patrick, Chief of the United States Army Air Service, at Mitchell Field shortly after their arrival. Reading from left to right are: Lieutenant Harding, General Patrick, Lieutenant Smith, commander of the squadron, Lieutenant Wade Lieutenant Ogden, Lieutenant Arnold, and Lieutenant Nelson.

Ship No. 2 (later christened the Chicago)—Lieutenant Lowell H. Smith; mechanic, Lieutenant Leslie P. Arnold.

Ship No. 3 (later christened the Boston)—Pilot Lieutenant Leigh Wade; mechanic, Staff Sergeant (now Lieutenant) Henry H. Ogden.

Ship No. 4 (later christened the New Orleans)—Pilot Lieutenant Eric Nelson; mechanic, Lieutenant John Harding, Jr.

There were in addition several alternates, who, however, were not called upon.

While the flyers were training at Langley the Douglas Company was working at full speed to have the planes completed and delivered in time for the scheduled take-off about the middle of March from Clover Field, a Government post near the Douglas plant at Santa Monica. The advance men were also started out over their respective divisions of the route and the State Department was entering negotiations with the various foreign countries on the route toward getting permission for passage of the planes which were classed as of military character, although they were bent upon a peaceful mission. There were over fifty stops scheduled along the route and at each of these points a supply of gasoline and spare parts was directed. The character of the supply kits was brought about after the most careful consideration of the possible needs of the flyers and planes once they were far removed from the well-equipped shops at the home bases. The entire assortment of material was arranged into a compact kit which itself was constructed of the same kind of wood used in the planes themselves. In case of emergency repairs being needed in the framework of the ships a supply of suitable wood could be secured by dismantling the kit. Some of the articles included in the supply kits and that were otherwise used in connection with the flight were:

Alemite Lubricating System—The Bassick Co., Chicago, Ill.

Altimeters—Taylor Instrument Co., Rochester, N. Y.

Batteries, Ignition, Storage—Willard Storage Battery Co., Cleveland, Ohio, and Cincinnati Storage Battery Co., Cincinnati, Ohio.

Bottles, Thermos, Universal—Landers, Frary & Clark, New Britain, Conn.

Breeches, Wading—Goodyear Tire & Rubber Co., Akron, Ohio.

Lamps (Bulbs) Electric—Western Electric Co., New York City.

Cameras—Eastman Kodak Company, Rochester, New York.

Cans, Measuring—Brookins Mfg. Co., Dayton, Ohio.

Coats, Kapok—A. G. Spaulding & Bros., New York City.

Compasses—General Electric Co., Schenectady, N. Y.

Compasses, Earth Inductor—Pioneer Instrument Co.

Compass, Master—Sperry Gyroscope Co., Brooklyn, New York.

Cores, Tires, Valves—A. Schrader's Sons, Inc., Brooklyn, N. Y.

Dope—Titanine Co., Union, N. J.

Ezy-Outs—Cleveland Twist Drills Co., Cleveland, Ohio.

Flashlights—Yale Electric Corp., Brooklyn, N. Y.

Gasket Paper—Fibre Finishing Co., Boston, Mass.

Glue, Marine—L. W. Ferdinand & Co., Boston, Mass.

Goggles—American Optical Co., Southbridge, Mass.

Goggles, Gogglette—E. B. Meyrovitz, Inc., N. Y.

Grinders, Portable Hand Driven—American Grinder Mfg. Co., Milwaukee, Wis.

Hoists, Chain—Yale & Towne Mfg. Co., New York City.

Hose—B. F. Goodrich Co., Akron, Ohio.

Indicators, Air Speed—Foxboro Co., Inc., Foxboro, Massachusetts.

Indicators, Flight—Pioneer Instrument Co., Brooklyn, N. Y.

Jacks—Walker Mfg. Co., Racine, Wis.

Oil—Vacuum Oil Company, New York City.

Propellers—Hamilton Mfg. Co., Milwaukee, Wis.

Pullers, Nail—Bridgeport Hardware Mfg. Co., Bridgeport, Conn.

Pumps, Bilge—Wilcox Crittenden Co., Middletown, Connecticut.

Pumps, Refueling—Blackmer Rotary Pump Co., Petosky, Mich.

Pumps, Tire—Frank Rose Mfg. Co., Hastings, Neb.

Fire Extinguishers—Pyrene Mfg. Co., Newark, N. J., and Fyr Fyter Co., Dayton, Ohio.

Radiator Compound—X Laboratories, New York City.

Spark Plugs—B. G. Corp., New York City, and Mosler Metal Products Co., Mt. Vernon, N. Y.

Starters—Eclipse Machine Co., Hoboken, N. J.

Tap and Die Sets—Greenfield Tap and Die Co., Greenfield, Mass.

Tape, Friction—Van Cleef Bros., Chicago, Ill.

Thermometers, Distance Type—The Motometer Co., Long Island City, N. Y.

Tires—Goodyear Tire & Rubber Co., Akron, Ohio.

Tubes, Inner—Ajax Rubber Co., Inc., New York City.

Unionalls—H. D. Lee Mercantile Co., South Bend, Indiana.

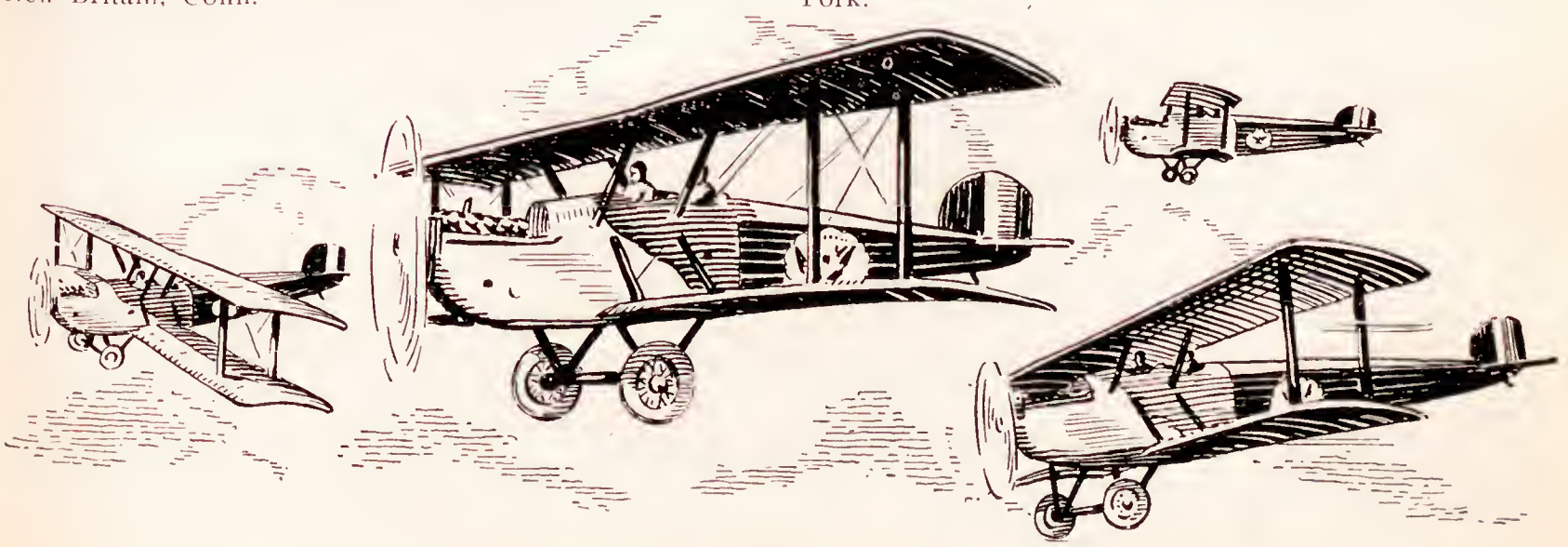
Valves, Liberty Engine—The Steel Products Co., Cleveland, Ohio.

Varnish, Valspar—Valentine & Compnay, New York City.

Veneer—The Haskelite Co., Chicago, Ill.

Wheels—Dayton Wire Wheel Co., Dayton, Ohio.

Wires, Streamline—Stewart Hartshorne Co., New York.



WORLD FLIGHT STARTS

IT was an impressive sight at Clover Field, Santa Monica, California, on the morning of March 17, when the World Cruisers Nos. 1, 2, and 3, departed on the initial hop of the great air journey around the globe. One visualizes the like scenes of centuries ago when those brave explorers of old set forth upon the unknown and uncharted sea which the superstitious nature of the people pictured as a dark, terrible waste of water from whence no man could hope to return.

To relate all of the details of the 27,000 mile journey of the Round-the-World Flyers would be impossible in a publication of this size; we can only touch upon the highlights, the unusual experiences which the airmen met with in the course of their flight over the long, tedious route.

Lieutenant Eric Nelson and his mechanic, Lieutenant Jack Harding, were not able to accompany their comrades at the initial hop from Clover Field. At the last moment it was found necessary to install a new engine and otherwise check up on the navigation instruments.

The remaining three planes which started at 9:00 o'clock from Clover Field made their first objective—Mather Field, Sacramento, at 2:00 p.m. A great crowd was present to greet the flyers. On the next morning the three planes took off at 9:00 o'clock and two of the ships arrived at Eugene, Oregon, at 3:55 p.m. The weather was clear over this period but strong head winds were encountered. Only forty miles were covered in the first hour of this hop, due to this condition. Lieutenant Wade was forced to land at Cottonwood, California, about seventy miles from Mather Field, due to water leakage from an open petcock, which had jarred open from the vibration of the plane. He caught up again at 5:32 p.m. at Eugene.

Vancouver Barracks, Washington, the next objective, was reached at 12:05 p.m. the following day, it requiring about one hour to fly the 110 miles.

Lieutenant Oakley Kelly of Non-Stop Transcontinental Flight fame, met the flyers at Eugene and accompanied them to Vancouver Barracks where they were royally entertained, however, they tarried but a brief period and were off again at 2:53 p.m. of the same day for Seattle. It was raining and the clouds were low. The flight proceeded down the Columbia River and up the Cowlitz River. The ceiling decreased to about 500 feet and the flight was finally turned back to Vancouver Barracks. Upon their return the flyers learned that Lieutenant Nelson had arrived at Eugene, having made a non-stop flight from Clover Field in 9 hours 25 minutes.

On March 20, the flyers again took off from Vancouver Barracks at 10:12 a.m., and Sand Point Field at Seattle, was reached at 12:50 p.m. Most of this hop was made with the planes flying above the clouds with only the compass to keep the planes on the course. At Seattle the flyers were met by the Lieutenant Governor of State, President of the Chamber of Commerce and other city officials. Major Martin, commander of the flight at this time, made the following report on the arrival at Seattle:

"At all of our stops we have been besieged by camera and newspaper men. All the newspapers on the Pacific Coast have given the flight greatest publicity with photographs and headlines on the front pages. We were again confronted with the same difficulties at other points of having an enthusiastic populace demand every opportunity and all our time, to show their appreciation of the fact that we have honored their city with this stop. Today has been spent in thoroughly inspecting and cleaning the engines and planes. The next few days will permit us to install our water pontoons and put a new engine in Lieutenant Wade's ship. This engine while functioning perfectly, has not given the maximum power expected of it for the long flight ahead of us. The physical condition of the personnel is excellent and the morale of the highest. We have received telegrams expressing good wishes, good luck and the successful completion of the flight from a great many sources. Every possible assistance has been offered by the Boeing Aircraft Corporation, the Chamber of Commerce, and by many individuals. Rickenbacker autos have been placed at our disposal while in Seattle. Greatest enthusiasm prevails here with reference to our flight. Lieutenants Nelson and Harding are again with us, having flown in from Eugene."

The world flyers left Seattle for Prince Rupert, British Columbia, at 9:00 a.m., April 6, and arrived at their destination at 4:54 o'clock in the afternoon, covering a distance of 650 miles. Necessary repairs to the Flagship *Seattle* delayed the flyers at Prince Rupert. They left for Sitka, 300 miles distant, at 9:00 a.m., April 10, and arrived there at 1:50 p.m. The take-off from Prince Rupert was made in a rain storm and for four hours the flyers pushed through the rain. Shortly before reaching Sitka the weather cleared and landings were made without difficulty. The Canadian Drydock Company assisted the flyers in servicing their planes.

Unfavorable reports of weather conditions ahead again delayed the airmen. Lieutenant Clayton Bissell, the advance officer of the first division of the World Flight, reported the route from Sitka to Cordova as being the most hazardous in that division, due principally to the lack of available landing area should it be necessary to stop enroute. Leaving Sitka the flyers followed the shore line and by passing over radio stations at Soapstone, Port Atthrop at Khaz Point, Yakatat, Katalla and Mile Seven, their progress was checked. Numerous icebergs were sighted along this route, and a chain of high mountains lie inland to the right—Mt. LaPerouse (10,756 feet high), and Mt. Crillion (12,727 feet high), standing out most prominently. The glaciers from this range come down to the shore, and breaking off there form icebergs in the Pacific.

The weather being good, the flyers took advantage of it and, instead of stopping at Cordova, they made a direct flight of 610 miles to Seward, leaving Sitka at 10:00 a.m., April 13, and arriving at their destination at 5:00 p.m. Seward, at a latitude of 60 deg. 6 min., is as far north as the flyers went until they reached Angmagsalik, Greenland, when they went up to 66 deg. 43 min.

The route from Seward to Chignik was also a difficult one, the airmen deviating from a straight line in order to pass over a better course and near a number of small settlements, going by way of Chugach Island; the entrance to Cook Inlet; The Barren Islands; along the shore of Kadiak Island to the head of Uyak Bay; thence along the headlands projecting from the southeastern shore of the Alaskan Peninsula to Chignik, the end of their 475-mile hop. An altitude of 5,000 feet or more was necessary to clear the mountains and afford the airmen a safe gliding height when passing over bad stretches. Numerous glaciers and several volcanoes were on the course, the most notable being Bear Glacier, Katmai Volcano and the Valley of Ten Thousand Smokes. Chignik is a native village, consisting of half a dozen unpainted houses, two or three huts, two churches and the buildings of the Northwestern Canneries Company. Among the supplies shipped, it was found necessary to include blankets for the flyers. Sergeant Rogers, of the Signal Corps went there to operate the radio station of the Canneries Company and to receive the flyers.

The arrival of the airmen at Seward marked the completion of the first tenth of the aerial journey around the world.

LEAVING Seward at 10:10 a.m., on April 15, three of the planes reached Chignik after a flight of 6 hours 25 minutes. Major Martin dropping out of the formation and making a forced landing in Portage Bay, about 100 miles short of Chignik.

The flight from Chignik to Dutch Harbor, a distance of 400 miles, was over one of the most desolate of the sections of the Alaskan Peninsula. A portion of the volcanic region of the peninsula is passed over where Pavlof, Shishaldin and Makushin Volcanoes are sighted. Pavlof Volcano, 8900 feet high, and Shishaldin Volcano, 9387 feet high, are prominent, active and almost continually smoking. The latter is in the middle of Unimak Island.

The start from Chignik was made at 11:00 a.m., April 19, and after a flight of seven hours and ten min-

utes, embracing several hours of fighting strong winds, the three planes arrived at Duteh Harbor at 5:10 p.m.

The U. S. Destroyer *Hull* diseovered Major Martin and his meehanic, Sergeant Alva L. Harvey, after they had spent all night in the plane and used up all of their distress signal roekets trying to attraet help. The night was calm and mild—and to this faet alone the flyers owe their lives. The U. S. Revenue cutter *Algonquin* carried a new motor, spare gas pump, gas and oil to the stranded eommander.

After the new engine was installed at Kanatak on Portage Bay, he was not able to depart from that place for Chignik until April 26, and even then shortly after his take-off he encountered a blinding snow storm. He arrived safely at Chignik late in the afternoon. Wretched weather eonditions still eontinued, and he was forced to wait at Chignik for four days, finally taking off for Dutch Harbor at 11:00 a.m., April 30. On the previous day his plane had 400 pounds of iee coated on it.

Major Martin Crashes

Missing for eleven days, word was finally received of Major Martin's miraculous escape after erashing against a mountain peak in a fog.

On May 11, a wireless message was received from Port Moeller, 100 miles west of Chignik, reporting the safety of the two missing men. The Associated Press report states that they were forced down on a mountain side one and one-half hours after leaving Chignik. Leaving their splintered plane after rescuing a few of their records and some rations, they started on a long tramp down the mountain side towards the north Pacific Ocean shore line. After many hardships they reached a trapper's cabin on the southern tip of Port Moeller Bay on May 7, and found some food and a warm place to sleep. They were utterly exhausted after the 7-day tramp under severe weather conditions, and rested two days in the cabin. They then walked to the beaeh, and the radio station at Port Moeller flashed the welcome news of their safety. Up to this time a vigorous, intensive search was eonducted to find the lost airmen.

Two U. S. Coast Guard cutters, the *Algonquin* and the *Haidi* plowed the waters of the turbulent, gale-swept north Pacifie day and night seeking a traee of them. Every bay and inlet was earefully eombed, small boats being dispatched from the eutters in bodies of shallow water where it was thought the men might be concealed behind small jetties of land. The U. S. Bureau of Fisheries vessel *Eider* also aided in the search together with numerous cannery boats within the 400-mile stretch between Chignik and Duteh Harbor. Numerous dog teams were sent out over the ice and snow in an effort to loeate the men on the Alaska Peninsula. All of them returned without an eneouraging word.

With the hope that springs eternal within the human breast, the search was prosecuted with renewed vigor, and orders were issued for Lieut. Earl S. Tonkin and Sgt. Ivan O. Cooper, mechanie, to proeeed by air from Crissy Field, San Franeisco, to Seattle, place their plane aboard the Coast Guard eutter *Bear*, proceed to Chignik, and start a search for the missing men from the air. These two men made a record-breaking flight on May 10, from San Francisco to Seattle, and were all prepared to start on their mission when the glad tidings as to the safety of the lost aviators arrived.

THE pilots at Dutch Harbor, under the leadership of Lieut. Lowell H. Smith, were not able to start for Nazan, Island of Atka, until 11:00 a.m., May 3. During their stay at Dutch Harbor the weather conditions were unusually severe even for the Alaskan Peninsula. It was reported that they attended Easter services in the little native Russian church, after which they cleared a tennis court of snow and indulged in some exercise. They covered the distance of 350 miles to Atka Island without mishap, arriving late in the afternoon.

Snow storms, variable winds and unsatisfactory weather reports ahead again delayed them, and after remaining a week at Atka they took off on May 9, for the Island of Attu, a distance of 530 miles. During this flight they battled strong head winds over rugged islands and rough seas and arrived at Chicagoff, Island of Attu, after about eight and one-half hours of flying, thus completing the first division of their flight around the globe.

Although their flight from the time they left Santa Monica was on the whole under unfavorable weather conditions and against strong winds, they covered a distance of 4255 miles in 60 hours and 50 minutes flying time.

The Coast Guard cutter *Haidi* pushed ahead of the flyers to assist them on their next hop into the second division to Paramushiru at the Bay of Kashiwabara.

In successfully negotiating their flight from Chicagoff, Island of Attu, to Kashiwabara Bay, Paramushiru, in the Kurile Islands, the world flyers accomplished one of the longest, if not the most hazardous, leg of the entire route before them, the air line distanee being computed at about 878 miles. They blazed a trail through skies never before invaded by an airplane. According to the Associated Press, the flyers explained that after hopping off from Attu Island on Friday morning, May 16, they had bucked a strong wind and a heavy snow storm which made necessary a foreed landing off Komandorski Point, Bering Island, clear off their course. While the airmen stayed at Bering Island only six hours, they had in the meantime crossed the 108th meridian (the international date line), so their time of leaving Komandorski was 8:00 a.m., Saturday. The rest of the flight to Kashiwabara Bay was made without mishap. The flyers were taken so far from their course by the storm that they had to go about 936 miles to complete the trip between Chicagoff and Paramushiru Island. The landing on Kashiwabara Bay was made shortly before noon, May 17. A boat put out from the U. S. N. Destroyer *Ford* at onee and picked up Lieut. Leigh Wade and his mechanie, Sgt. Henry H. Ogden, of the Air Cruiser *Boston,* and Lieut. Erie H. Nelson and his mechanic, Lieut. John Harding, Jr., of the Air Cruiser *New Orleans*. Commander H. H. Frost of the *Ford* greeted the tired, but happy, birdmen at the gangway of the destroyer and the crew extended a rousing greeting. In the meantime the ship got under way, crossing the straits to Shimushu Island, where the Air Cruiser *Chicago,* with Lieut. Lowell H. Smith, acting flight eommander, and Lieut. Leslie P. Arno'd aboard, had landed. All of the aviators agreed that the flight from Attu Island had been the hardest and most trying of their journey so far, the jump from Sitka to Seward, Alaska, being the second worst.

The world flyers were delayed at Paramushiru Island by bad weather until May 20 (May 19, in U. S.), on which date they left Paramushiru at 7:35 a.m., and landed in Hitokappu Bay on Yetorofu Island, 510 miles south, at 2:46 p.m., flying through low fogs with very poor visibility over one-half the distance. The U. S. S. *Pope* awaited them with supplies and fuel, and a Japanese destroyer was on hand to act as host.

Between Santa Moniea, Calif., and Hitokappu Bay, Japan, the airmen covered 5625 miles in 80 hours and 31 minutes flying time, which means that they maintained an averagc speed of seventy miles an hour throughout the flight. When they completed the flight to Kasumiga Ura they covered 6495 miles and had 18,836 miles to go to complete the circumnavigation of the world.

The Chief of Air Service, under date of May 23, reeeived the following message from Lieut. Lowell H. Smith, dated Tsuchiura, Japan, May 22, eovering the flight from Hitokappu Bay to Tokyo.

"Left five thirty-three, landed Minato after flying over and under fog at ten forty-three, five hours and ten minutes. Left Minato twelve forty-five number two foreed back with battery short. Landed, repaired, took off one fifteen and flight landed Tokyo five thirty-five. Four hours and twenty minutes. Work starting in morning to prepare planes next division."

The world flyers remained at Tokyo from May 22, to June 1, during which time their planes were given a general overhauling and the engines and pontoons changed. At 6:10 a.m., June 1, they left for Kushimoto, Japan, a distance of 360 miles, and arrived there in a

heavy rain at 10:30 a.m., the distance being covered in 4 hours and 20 minutes.

Kogoshima, the last stopping point in Japan, was reached at 7:02 p.m., June 2, after a flight of 6 hours and 12 minutes. The American aviators waved farewell to Japan on the morning of June 4, when they took off for Asiatic mainland, that is to say, two of the flyers (Lieutenants Wade and Nelson) took off, Lieut. Lowell H. Smith, the flight commander, being unable to do so because of engine trouble. The latter and Lieut. Leslie P. Arnold spent the entire day making necessary repairs and left the following day.

Flyers Reach China

Lieutenants Wade and Nelson were warmly welcomed at Shanghai. Newspaper reports state that Shanghai, fully realizing the historical significance of the first flight across the Pacific Ocean, shut up shop and went down the river six miles to the landing point in house boats, sampans, launches, tenders and junks. The river banks were lined with crowds for miles. The airmen were given a luncheon and an address of welcome was delivered by the mayor of the city. Others welcoming the party were the British and Japanese consuls and two Chinese commissioners, representing the Chinese government. Lieutenant Nelson, in a brief acknowledgment of the greetings, stated that the trip across the China Sea was the most perfect of all the hops and that the landing arrangements were the best experienced since leaving California. The reports further state that the American and Chinese communities were outdoing themselves in entertaining the daring Americans.

Lieutenant Smith with Lieutenant Arnold, left Kogoshima at 6:10 a.m., on the morning of June 5, and at 12:10 p.m., reached Shanghai, when they rejoined their companions. Reports state that the flight leader experienced clear weather during the trip across the China Sea. Their flight through the third division, from Shanghai, China, to Allahabad, India, the starting point of the fourth division, embraces a total of approximately 4725 miles, the following being the itinerary:

Shanghai to Amoy, China, 555 miles; to Hong Kong, China, 300 miles; to Haiphong, Tourane and Saigon, in French Indo-China, 500, 395 and 530 miles, respectively; to Bangkok, Siam, 675 miles; to Rangoon and Akyab, Burma, 450 and 445 miles, respectively; to Calcutta and Allahabad, India, 400 and 475 miles, respectively. It will be noted that the longest "hop" in this division is the 675 miles from Bangkok, to Rangoon.

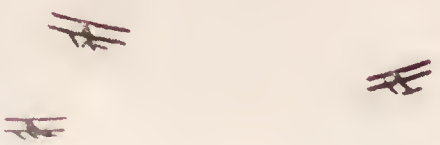
THE Round-the-World flyers experienced a little hard luck after leaving Shanghai, China, mechanical breakages and bad weather combining to set them back about five days in their schedule. They took off for their next stop, Amoy, China, 555 miles distant, at 6:50 a.m., June 8. Lieutenant Smith, however, was forced to return shortly after the take-off, due to engine trouble. Fortunately, this did not delay him to any extent, and all the members of the expedition arrived at Amoy, at 4:38 o'clock that afternoon. They stopped half way to Amoy to refuel their planes, with the assistance of the U. S. Navy.

Due to the extreme heat at this stage of their journey and the difficulty experienced in taking off from smooth water with heavily loaded planes, the pilots deemed it advisable to carry short rations of fuel and to take advantage of intermediate stopping points.

Leaving Amoy at 9:15 a.m., June 9, they arrived at Hong Kong, China, at 12:35 p.m., covering a distance of 300 miles. The following day, June 10, at 9:15 a.m., they departed from the busy Chinese seaport and winged their way for 500 miles to Haiphong, French Indo-China. Here they were delayed a day, due to torrential rains and violent storms.

At 10:10 a.m., June 12, they set forth for Tourane, French Indo-China, a distance of 395 miles. Lieutenants Wade and Nelson arrived at Tourane in the afternoon. Lieutenant Smith was forced down at Hue, the capital at Annam, a few miles north of Tourane, due to engine trouble caused by a leaky cylinder. A new engine was rushed to him from Saigon on board a U. S. Naval Destroyer. It required twenty-four hours to install the new engine, after which Lieutenants Smith and Arnold in the Flagship *Chicago* took off and rejoined Lieutenants Wade and Nelson at Tourane. The reunited flyers made the flight to Saigon, a distance of 530 miles, on June 17, leaving Tourane at 6:00 a.m., and arriving at Saigon at 12:35 p.m., the flight incidentally reaching its most southern point near the equator.

Saigon is known as the "Paris of the Orient." The aviators here were in the hottest climate which they probably encountered during their entire flight. The flight through this



Flyers bid Good-bye to Japan

Above—Huge crowds at Paris greet American World Flyers.

At right—Lieut. Lowell H. Smith, commander of the flight, is welcomed at London by Mrs. Stuart MacLaren, wife of British Flyer

division of the route follows the coast line of French Indo-China to Bangkok, Siam, cuts through a pass in the mountains near Mount Koni, 100 miles south of Bangkok, on the Malay Peninsula, to the town of Tenesserim; then proceeds northwest to Rangoon, Burma; thence to Akyab and Calcutta. The route aeross this narrow point in the Malay Peninsula was followed rather than proceeding around the Peninsula, by way of Singapore, which would add more than 1000 miles to the flight. Originally, a much shorter route to Calcutta was planned overland, using wheels for landings and stopping at Hanoi, French Indo-China, and Mandalay, Burma, famous in song and story. Investigation of the route through this seetion showed that the landing fields were very scaree and the cost of making them prohibitive, so that pontoons were used and the shore line followed, as above outlined, as far as Calcutta, India, where landing wheels were attached and pontoons removed. Furthermore, the inland route across French Indo-China and Burma was over uninhabited mountainous eountry, where forced landings would have been disastrous. The eoastal route whieh was followed, even with its eroeodiles, swamps and barbarians, but with a chance of rescue by passing vessels in case of forced landings was preferable to the risk of landings in mountains and trackless jungles, uninhabited except by wild beasts and poisonous reptiles and inseets, with its hopelessness of rescue in case of foreed landings before succumbing to the terrors of the jungle.

Flyers Pass Over Tropical Jungles

The flight to Saigon consumed 6 hours and 35 minutes, during which time the aviators passed over a picturesque and historic eoast. Kamranh Bay, 325 miles south of Tourane, is the wonderful harbor which became famous during the Russo-Japanese War.

The shores of Freneh Indo-China from Tourane south were for a time the temporary roost of Malay pirates. They would swoop down upon unsuspecting traders, who ventured too elose to the shore, from the mouths of rivers and hidden lagoons, and sometimes when they had reason to expect a rich prize they would lie boldly in wait with great fleets of well-manned proas. They were the terror of the eoastwise traders throughout the entire China Sea until American and European war vessels forced them to abandon their practiees. Forced to cease their roving and lawless habits, the Malays settled down to the less exciting oceupations of agriculture and trade, and along the eoasts many of the tribes have reaehed a rather high state of civilization.

At Saigon the flyers found a modern eity, with numbers of European buildings, schools and colleges, with a heterogeneous native population composed mostly of Anamites and Chinese, though some Hindus, Burmans and Malays add eolor to the population.

The southernmost part of Indo-China is notoriously unhealthful beeause of the excessive moisture, combined with eonsiderable heat.

The landing of the Ameriean flyers at Saigon was effected at the French Army Hydroplane Station on the Donai, or Saigon River, north of the city. The French airmen and authorities welcomed the Ameriean flyers and placed every facility available at their disposal. The world flyers remained one day at Saigon, making the always necessary minor repairs and adjustments and allowing time for the American destroyer which was carrying gas and oil to reach Kampongsom Bay on the eastern side of the Gulf of Siam in Cambodia, half way between Saigon and Bangkok.

Receiving word of the arrival of the destroyer at Kampongsom, the flight took off for that loeality on June 18, enroute to Bangkok. The route for the first 430 miles followed the coast of the China Sea and the Gulf of Siam, around the southern extremity of Cochin China. This coast, though low and sandy, and in many places bordered by mangrove swamps, afforded many excellent sheltered lagoons, where landing eould be made in the event of an emergeney and where help could be obtained from coasting vessels or the inhabitants. It would have been considerably shorter to have crossed the lower end of Indo-China, in faet,

more than 100 miles would have been saved, but such a course would have meant the crossing of the mangrove swamps and jungles of the Mekong Delta, where, if a plane were forced to land, it is doubtful if same could be effected without injury to the crew, and, if this were accomplished, whether they could penetrate the swamp and jungle to safety. For over 350 miles the flyers skimmed along the low, sandy coast, bordered by jungle and swamp, until the city of Kampot in Cambodia was reached. At this point the character of the country changed and the coastline became higher; in fact, rugged and precipitous in places. The landing on Kampongsom Bay was effected at the mouth of the Kampongsom River, which was sufficiently well sheltered to allow the planes to refuel from the destroyer which had awaited them there. Although the northern shore of the Bay is low and covered with mangroves, the southern shore of the bay is high and rugged and there are numbers of small native villages from which a large trade in native products is carried out through the medium of coasting junks. After refueling, the flight again took off for Bangkok, which was still 245 miles to the northwest, at the very northern end of the Gulf of Siam.

Bangkok is the capital and seat of commerce of the Kingdom of Siam.

Siam is a kingdom. The present ruler is His Majesty, Rama the Sixth. It is a well-known fact that Siam is one of the most progressive eastern countries. It has a very excellent railroad system and is rapidly becoming a modern and up-to-date nation. Siam has a progressive aeronautical program, both for the army and for commercial aviation. Several large airdromes have been established throughout the kingdom and are now in operation.

The American flight was enthusiastistically received by officials of the Siamese government and by almost the entire European population.

IN the week preceding their arrival at Bangkok the flight covered 1205 miles, greater progress being impossible on account of the extreme heat which they encountered. A total distance of 10,795 miles was covered since leaving Santa Monica, leaving 14,536 miles yet to be covered before the globe was completely circumnavigated.

Between Bangkok and Rangoon, Burma, arrangements were made for another emergency refueling point at Tavoy on the coast of Burma, 240 miles south of Rangoon, at the mouth of the Tavoy River, which empties into the Bay of Bengal, this for the reason that shortly after leaving Bangkok it was necessary to climb to an altitude of 6000 feet, and with a full load of fuel the planes were very heavy and a great strain would have been placed on the motors attaining this altitude with their heavy load in the short time before they reached the mountains. Therefore, the planes carried *only half their fuel capacity, just sufficient to reach* Tavoy, where they were met by an American destroyer with gasoline and oil on board.

Next we hear of the flyers at Calcutta, India. Akyab is the place where Captain MacLaren, of the British Round-the-World Flight, was then placing in condition the plane sent him from Hakodate, Japan, on the American destroyer *Preston,* the plane with which he started out from London on a round-the-world flight crashing while making a landing in the harbor.

Incidentally, Akyab is where Major Blake came to grief in his attempt to circumnavigate the globe for Great Britain in 1921. He was forced down forty miles at sea off Akyab, and he and his fellow pilot clung to the wreckage of their plane for several days before they were rescued by a passing vessel. In arriving at Calcutta the American airmen escaped the "Jinx of Akyab."

The Round-the-World Flyers made considerable prog-

Continued on page 23

—Photo copyrighted by Underwood and Underwood.

This photo shows Lieut. Leslie P. Arnold, mechanic of the flagplane "Chicago," signing the register at the Boston Airport immediately after the three round-the-world planes had landed in the harbor nearby, September 6. Behind him are, left to right: Lieut. John Harding, Jr., mechanic of the "New Orleans"; Lieut. H. H. Ogden, mechanic of the "Boston II," which joined the other two planes at Pictou, Nova Scotia, that Ogden and his chief might finish the flight after the "Boston" had crashed in flying from the Orkney Islands to Greenland; Lieut. Eric Nelson, commander of the "New Orleans"; Lieut. Lowell H. Smith, commander of the flight and of the flagplane "Chicago"; and Lieut. Leigh Wade, commander of the "Boston," and now of the "Boston II."

THE DAYTON AIR RACE MEET

Was It a Failure and Why?

IT is only just to state that quite a few citizens of Dayton, usually so wrought up in enthusiasm for aviation are now entertaining a sorely dampened ardor for things aeronautical as a result of the financial failure in the consummation of the International Air Races. What with the embarrassment of several hundred one time cheerful guarantors to the Air Race Fund who are now coming forth with their pro rata share of the $75,000.00 deficit and the sad death of Captain Burt Skeel as a climax to the three-day meet the lay element of citizenry has about decided that the honor accorded a city as the scene of the International Air Races is a dearly bought one.

It will take a lot of explaining to convince the various unfortunate individuals who sunk their money heavily in concession rights,—to those who fitted up their spare rooms with new furniture to entertain (at an inflated rate) the out of town visitors—to farmers who grubbed up their tobacco patches on the neighboring hills to make way for parking space—for the poor chap who had designed to corner the mustard market with a purchase of ten barrels to supply the illusionary hordes of hot dog venders, etc., etc., that the Dayton Race meet was a success in any degree whatsoever.

Of course, it is quite natural that the bulk of Dayton folks held the impression that the staging of the Air Races would bring about a sudden prosperity boom to the city, and rich and poor plunged alike in the fascinating venture of getting rich quick, —in three days, to be exact. Consequently, at the present time these people are in no mood to appreciate any benefits derived from the Air Races other than the purely financial. They calculated, all along, the success of the air meet in terms of the number of free spending strangers it would draw and how many dimes would clink over their counters of fresh new pine boards. Dayton, in other words, is now playing a poor hand and ruining its reputation as a booster of aviation when its citizens rant for not having made a business success of the Air Races.

The fact that the concessions people lost money and that there is a large deficit in the final check of the air race books is no argument that the event was a failure. No city has ever made the International Air Races pay. St. Louis in 1923 and Detroit in 1922 both had a large deficit to meet in staging the races, and Dayton is a much smaller city than either.

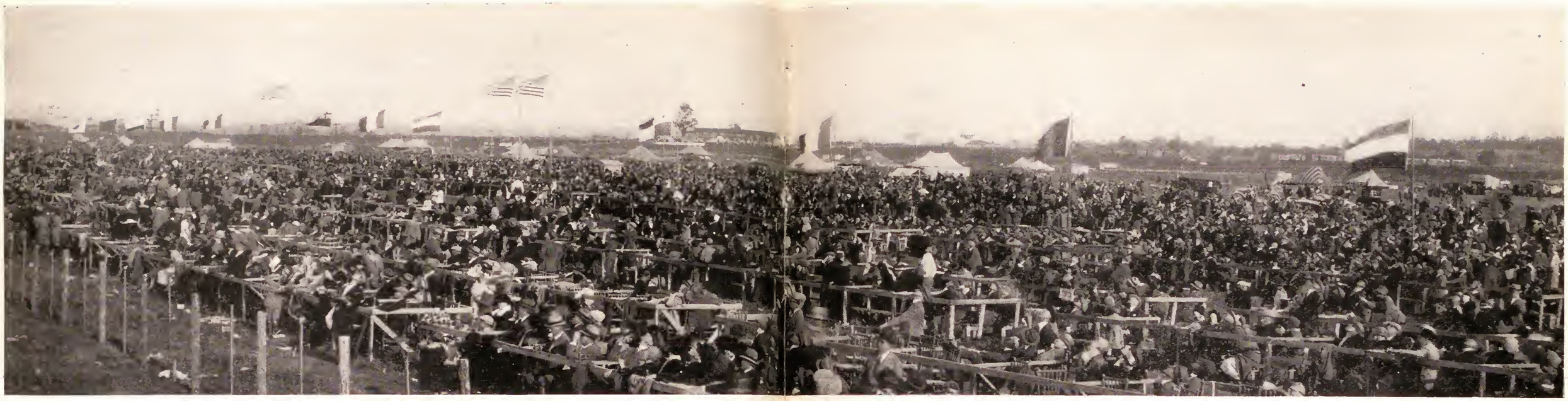
Lack of attendance, of course, was the one contributor to the disappointment of Dayton people. For six or eight months they had been living in the belief that no less than 250,000 visitors would attend the air races. Enormous preparations were made to take care of this vast influx—"the greatest crowd that had ever attended an event in the middle west would be there," so said the press. Hotels, rooming houses, apartments and thousands of private homes were listed in Dayton and surrounding towns and cities with a view to coping with a housing shortage. Day and night for a week prior to the date of the races the baker, the butcher, the soft drink man and the candy maker plied his trade to help make the visitors comfortable and cheerful, and, incidentally, to make him pay well for the privilege. The railways and bus lines built special "bull pens" to quell the mad rush of the surging throngs of air race spectators. Dayton, the city which had been dubbed as too small to handle the crowds was prepared to show the world how she was equal to any occasion no matter how much preparation and elaborate engineering it required. Vainly through the first and second day of the meet, the city of Dayton waited for the rush. Not until noon of the last day did they give up hope that the 250,000 were not coming and that there was something radically wrong.

Now that it is over everybody is offering an opinion but no particular one seems to know why the people were not there. The easiest way to console one's shattered hopes, so Dayton people seem to think, rests in sorely rating the Air Race management for varied and sundry shortcomings in handling the big meet. Some say that visitors were scared away by the erroneous impressions gained through press reports concerning the lack of housing facilities. Others say that the reported high rate of admission was the cause, or the withdrawal of foreign entries in the Pulitzer Race. Still others feel that a lack of "showmanship" in not distributing free comps to the press and permitting cheap road posters to be used did the damage. The less rabid group admits that perhaps it was the condition of the times and that the public was holding a death grip on its dimes in anticipation of the periodical panic just before election, and would not spend money to attend the air races. But whether for this cause or that, the 250,000 were not there, nor even a third this number.

But with all, the Dayton Air Races, were not a "failure" nor will the fact that a record crowd did not attend detract from the general and lasting good it will accomplish for the city and aviation. Aeronautically, at least, the 1924 Air Races was in every way successful.

The general consensus of opinion and expression of Government officials, foreign visitors, Army and Navy heads, and thousands of others directly connected with aviation or the automotive industry is that the Dayton Air Races was an exceptional success—in fact, the best meet that has been held in the United States to date.

To say the least, there has never been a time when any event either in or out of aviation circles, that a



View at the International Air Races, Dayton, Ohio, Oct. 2, 3, 4. The site of this great event represents the future permanent location of the Engineering Division, Air Service (McCook Field)

larger representation of public spirited citizens offered more unselfishly of their time, money and good will than did those who assisted in staging the Dayton Air Races. The citizens of Dayton stood indeed as the finest example of civic pride that has ever been set forth in any community. "Every one connected with the project worked as a unit, heart and soul, and neither time nor money was spared for the success of the Air Races," states C. H. Paul, General Manager of the Air Race Body. Even General Patrick, chief of the Air Service comments that from the point of management the races were better taken care of this year than ever before. The punctuality with which each event on the program was staged was a revelation to all people who have followed the Air Race events in former years. Dayton's facilities for holding the meet were demonstrated as being unsurpassed. There were good roads leading to the airdrome from all points of the compass and traffic was kept moving along at the highway speed limit. Civilian pilots seem to have received none too good treatment at the hands of ground officials, but, considering all angles they were better provided for than at other meets.

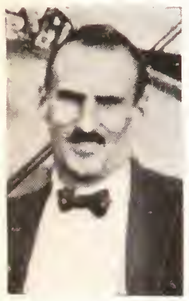
The site of the Air Races on the great sod covered expanse of lowland, soon to be developed as the new home of the Engineering Division Air Service was an ideal place for the event. It would have accommodated 300,000 people with plenty of elbow room for all. Knowing what we do now, of course, it is plain that the layout of the airdrome as to seating, and advantage to concession people was on much too large a scale. Too much space was used, even should the full attendance have been present.

In conclusion let it be said that so long as attendance figures so highly in the popular conception of "success" in the International Air Races it will be well for the city who contemplates taking on the responsibility of the meet in the future, to consider some radical changes as to entertainment features. We pity the town in the future who tries to induce several hundred thousand people to become interested in mere "air races." The whole thing resolves to the point that the general public is still woefully ignorant on this aviation business. The crowd at Dayton (such as it was) in the most part did not know, or care, when a race was going on and indeed, were so engrossed in talking crops and politics that poor Burt Skeel was buried in twelve feet of muck before they were even aware that the Pulitzer Race—the feature drawing card on the annual Air Race meet was in progress. People have grown accustomed to watching airplanes fly from a distance, and they had no opportunity at the race meet to observe the various types at close range. There is nothing so dull as watching a plane swing around a pylon. To the average spectator there is no semblance of the race feature attached to it. Even the novelty of tremendous speed is lost through lack of comparative factors and consequently a plane traveling at 230 miles per hour has not as much of a thrill for the average onlooker as four or five race horses coming down the home stretch at less than one-third the speed.

The Dayton Air Races have shown that the public no longer can be depended upon to attend ordinary air races as they are now conducted. The average spectator wants excitement, thrills, unusual stunts and a crash or two thrown in to make the Roman holiday more exhilarating and help give one his money's worth at a dollar general admission fee, and several additional greenbacks for a seat on a splintery 2x4 inch plank designated as "reserved box."

In the future it must be an air circus throughout with possibly a goodly assortment of country fair side shows to give rests to craning necks. Air Races can never again be expected to attract huge throngs from the masses, at least, in North America and any city, no matter how large it is, would be foolish to make the preparation instituted by Dayton in anticipation of this happy thought. The airplane is beyond its infancy so far as being a novelty to the public is concerned. The International Air Races if carried through in the usual way in 1925 is bound to fail again in attendance. For the benefit of aeronautics it will be well to continue them, but as a business proposition the task is hopeless.

FIRST PRIZE WINNERS IN AIR RACE EVENTS



Chas. Jones
Winner "On-to-Dayton" and Central Labor Union Races

Walter Lees
Winner N. C. R. Trophy

Lt. D. J. Duke
Winner Liberty Engine Builders Trophy

Robert Jaros
Winner Mulvihill Trophy

Basil L. Rowe
Winner Detroit T. & C. Club Trophy

Lt. D. M. Myers
Winner Dayton Chamber of Commerce Trophy

J. M. Johnson
Winner Dayton Daily News Trophy

H. C. Mummert
Winner Dayton Bicycle and Engineers' Club Trophy

Lt. C. Bettis
Winner John L. Mitchell Trophy

Lt. H. H. Mills
Winner Pulitzer Trophy

Etienne Dormoy
Winner Rickenbacker Trophy

INTERNATIONAL AIR RACE RESULTS

FIRST DAY

Event No. 1

Dayton Chapter N. A. A. Trophy "On-to-Dayton" Race. Prizes—$3,500 in Liberty Bonds.

Charles S. (Casey) Jones, Garden City, N. Y., Curtiss Oriole, 1,239 points.

Event No. 2

The National Cash Register Company Trophy Race. Prizes—$3,000 in Liberty Bonds.

	Standing	Miles Per Hour
Walter Lees, Dayton, Hartzel FC-1	1	97.45
Perry Hutton, Chicago, Laird Commercial	2	93.15
R. G. Page, Chicago, Yackey Sport	3	87.35
A. E. Johnson, Dayton, Swallow	4	87.24
W. H. Beach, Wichita, Kans., Swallow	5	87.
W. A. Yackey, Chicago, Yackey Sport	6	85.22
D. A. Ashew, Ardmore Okla., Curtiss	7	85.22
John L. Burns, Fenton, Mich., OX-5 Special	8	79.20
N. W. Cleveland, Bridgefield, Pa., Laird-Swallow	9	78.03
Tex LaGrone, Kansas City, Mo., Rogers	10	74.01
M. M. Merrill, Dallas, Tex., Canuck	11	72.98
B. L. Whalen, Dayton, R-W Special	12	70.05

Event No. 3

CENTRAL LABOR UNION TROPHY RACE

Prizes—$3,500 in Liberty Bonds

	Standing	Miles Per Hour
C. S. Jones, Garden City, N.Y., Curtiss Oriole	1	125.05
J. C. Ray, Garden City, N.Y., Curtiss Oriole	2	107.22
C. C. Caldwell, Cleveland, Martin Commercial	3	103.04
Walter Lees, Dayton, Hartzel WC-1	4	98.05
Perry Hutton, Chicago, Laird	5	92.70
W. A. Yackey, Chicago, Yackey Sport	6	92.32
A. E. Johnson, Dayton, Swallow	7	86.88

LIBERTY ENGINE BUILDERS TROPHY

Prizes—$3,000 in Liberty Bonds

	Standing	Miles Per Hour
Lt. D. J. Duke, Washington, D.C., DH-4 Special	1	130.34
Lt. A. E. Simmonin, Moundsville, W.Va., DH-4 Special	2	128.00
Lt. C. A. Cover, Fairfield, DH-4 Special	3	124.13
Lt. R. D. Knapp, Maxwell Field, DH-4 Sp.	4	123.40
Lt. J. E. Haddon, Brooks Field, DH-4 Sp.	5	119.55
Lt. R. J. Brown, Jr., Boston, DH.-4 Sp'l	6	118.20
Maj. C. L. Tinker, Fort Riley, DH-4 Sp'l	7	116.78
Lt. L. B. Beau, Jr., Bolling Field, DH-4 Sp.	8	115.38

SECOND DAY

Event No. 5

MULVIHILL MODEL TROPHY EVENT

$500 in Cash Prizes

Robert Jaros, Chicago, flew 300 feet aloft 10 minutes, 14.2 seconds. Eight lesser prize winners.

Event No. 6

AVIATION TOWN AND COUNTRY CLUB OF DETROIT EVENT

Prizes—$4,000 in Liberty Bonds

	Standing	Miles Per Hour
Basil L. Rowe, Allaben, N.Y., S V, 3-seater	1	111.5
J. C. Ray, Garden City, N. Y., Curtiss Oriole-2	2	107.5
W. L. Stultz, Hasbrouck Heights, N. J., Atlantic S-3	3	106.5
C. C. Caldwell, Cleveland, Martin Model 7-4	4	102.39
Walter Lees, Piqua, Hartzel FC-1-5	5	97.85
Perry Hutton, Chicago, Laird Commercial-6	6	90.35
Walter H. Beach, Wichita, Kans., Swallow-7	7	89.74
Harold E. Hartney, Dayton, Yellow Aircraft-8	8	74.81

Event No. 7

DAYTON CHAMBER OF COMMERCE TROPHY EVENT

Prizes—$4,000 in Liberty Bonds

	Standing	Miles Per Hour
Lt. D. M. Myers, Phillips Field, Martin Bomber	1	109.85
Lt. C. F. Woolsey, Brooks Field, Martin Bomber	2	108.
Lt. Hez McClellen, Brooks Field, Martin Bomber	3	104.59
Lt. Harold D. Smith, Langley Field, Martin Bomber	4	103.25
Lt. Carlton F. Bond, Phillips Field, Martin Bomber	5	101.17
Capt. George C. Kenny, McCook Field, Martin Bomber	6	96.82
Lt. L. P. Hudson, Phillips Field, Martin Bomber	7	94.9

Event No. 8

DAYTON DAILY NEWS TROPHY EVENT

Prizes—$3,250 in Liberty Bonds

	Standing	Miles Per Hour
J. M. Johnson, Dayton, Driggs-Johnson	1	64.07
E. Dormoy, Dayton, Dormoy	2	50.1

Event No. 9

DETROIT NEWS AIR MAIL TROPHY EVENT

Prizes—$4,000 in Liberty Bonds

—CANCELED—

Event No. 10

DAYTON BICYCLE CLUB-ENGINEERS' CLUB TROPHY EVENT

Prizes—$5,000 in Liberty Bonds

	Standing	Miles Per Hour
H. C. Mummert, Dayton, Mummert Sport	1	38.24
J. M. Johnson, Dayton, Driggs-Johnson	2	22.3

Event No. 11

JOHN L. MITCHELL TROPHY EVENT

	Standing	Miles Per Hour
Lt. Cyrus Bettis, Selfridge Field, Curtiss PW-8	1	175.43
Second Lt. D. F. Stace, Selfridge Field, Curtiss PW-8	2	173.7
Lt. T. K. Matthews, Selfridge Field, Curtiss PW-8	3	173.32
Lt. E. C. Whitehead, Selfridge Field, Curtiss PW-8	4	172.56
Lt. James D. Summers, Selfridge Field, Curtiss PW-8	5	172.2

Event No. 12

PULITZER TROPHY EVENT

Prizes—$10,000 in Liberty Bonds

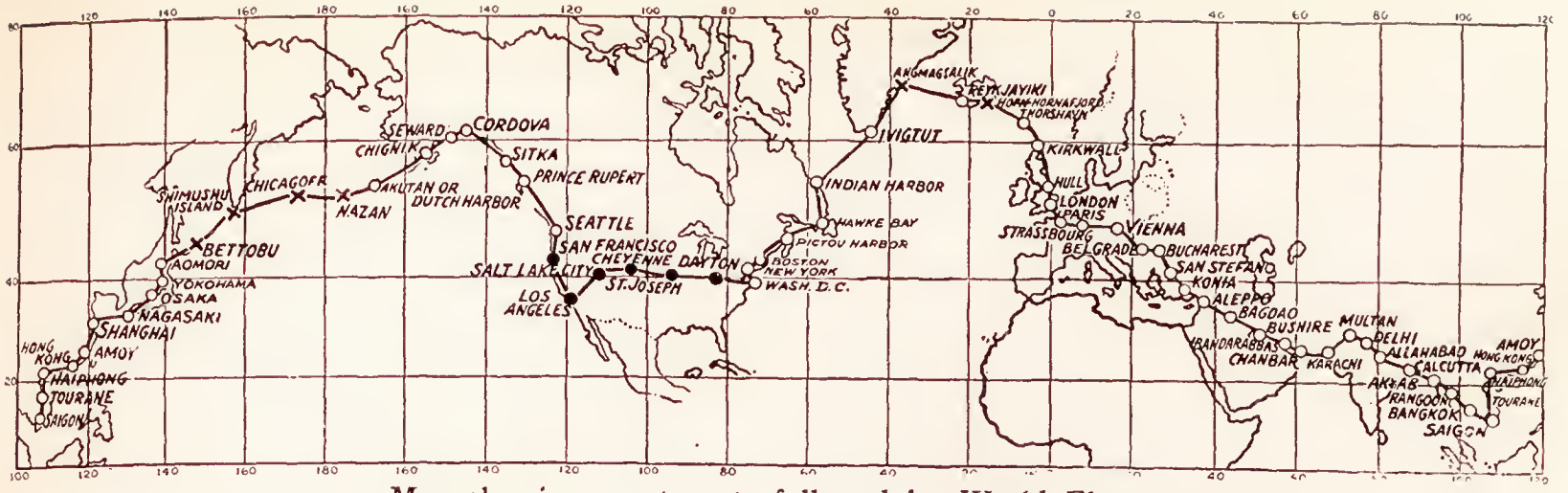
	Standing	Miles Per Hour
Lt. H. H. Mills, Wilbur Wright Field, Verville Sperry	1	215.72
Lt. W. H. Brookley, McCook Field, Curtiss R-6 Racer	2	214.45
Lt. Rex K. Stoner, Langley Field, Curtiss PW-8	3	167.95

Event No. 13

RICKENBACKER TROPHY EVENT

$800 in Prizes

Etienne Dormoy, McCook Field	1
J. M. Johnson, Johnson Field	2



Map showing exact route followed by World Flyers.

Continued from page 18

ress during the period between June 21, the date they left Bangkok, Siam, and July 6, when they arrived at Bandar Abbas, Persia. In the sixteen days they covered a total of 3710 miles, stopping at eleven plaees. It should also be borne in mind that in this period they completely overhauled their planes, fitting them with new engines and new wings, and substituting landing wheels for pontoons.

The American airmen remained in Bangkok one day. Leaving Bangkok, the aviators flew direetly west, and after covering 100 miles crossed the Siam-Burmese border line at the apex of the mountain range, whieh is such an excellent boundary between these countries. At Tavoy, the intermediate landing plaee between Bangkok and Rangoon, they were met by the U. S. Destroyer *Pruitt*, and after refueling they passed up the Burmese coast, flying in a northerly direetion, reaehing Rangoon on the afternoon of June 21, and covering the distance of 450 miles to Rangoon in 7 hours and 10 minutes.

Natives Damage Plane

When the planes took off over the water at Tavoy, both the *Boston* and the *New Orleans*, piloted by Lieutenants Wade and Nelson, broke wires beeause of the extremely heavy sea whieh was running at that time, but despite this slight damage the planes continued to Rangoon without stopping, landing in front of the city, where the pilots made the planes fast for the night. The American expedition was enthusiastically received, and every facility was plaeed at their disposal. Unforeseen delay was encountered at Rangoon, due to the fact that during the night a native sampan collided with Lieutenant Nelson's plane, eausing eonsiderable damage to the wings. New wings, however, were awaiting the flight at Caleutta, a distance of 845 miles, and it being considered inadvisable to delay the flight to wait for these spares, the wings were repaired suffieiently to allow Lieutenant Nelson's plane to aecompany the flight to Calcutta.

Futher misfortune overtook the flight at Rangoon, when Lieut. Lowell H. Smith was suddenly stricken with acute intestinal disorder, attributed to the water obtained at Tavoy. After receiving medieal attention, however, he was able to eontinue his work with the flight and assist in making the repairs whieh were necessary.

The establishment of an emergency base between Rangoon and Akyab was deemed essential, and the American destroyer *Sicard* proceeded to the mouth of the Bassien River with fuel and oil for the flight. This precaution was necessary beeause, in addition to the difficulty experienced in getting the planes off with a heavy load during the heat of the day because of the fresh water in the river, the planes were less buoyant.

On June 26, after word had been received that the *Sicard* had reached the Bassien River mouth, the planes took off at 9:29 a.m., Lieutenant Smith feeling well enough at this time to fly his own ship. After refueling at the Bassien River, the journey to Akyab was resumed, the airmen arriving there at 2:35 p.m. With their arrival at Akyab they covered a total of 11,690 miles since leaving Santa Monica, California, with 13,636 miles yet to go.

THE next day, June 27, the Ameriean expedition took off for Caleutta, India, the terminus of the third division of the Round-the-World Flight, leaving in the morning, as usual, and arriving in the afternoon, the distance covered being 445 miles. In reaching Calcutta the Ameriean flyers eompleted the greatest distanee so far attained by an aerial expedition, and ineidentally they erossed suceessfully the seeond great obstaele in the path of their flight—the first being Minato on the eoast of Japan, after erossing the Paeifie, and the second in safely passing through the typhoon belt of the China Sea and the monsoon of the Bay of Bengal.

At Caleutta but three days were required to eomplete-ly refit the air cruisers with new wings and new motors, and to replace the pontoons used for landings on the water with the regular wheel landing gears whieh were used until England was reached. It was thought at first that this work would require at least a week. Lieutenant Smith did not consider his painful injnry of suffieient importance to keep him from taking his accustomed plaee in the pilot's eoekpit and leading his flight towards Allahabad on June 30. After leaving the Royal Air Foree airdrome at Dum Dum, North Calcutta, at 6:30 a.m., the flight soon passed out of the lowlands of the lower Ganges Valley with its paddy fields and teeming rural population into the high, rolling and somewhat mountainous country in northwestern Bengal and finally into the Plains of Bihar and the united provinees of India in which Allahabad is situated.

When the flight landed at the Royal Air Force airdrome, west of the saered eity of Allahabad, the Ameriean airmen were welcomed by the English aviators stationed there.

The distance from Calcutta to Allahabad, 475 miles, was eovered in 6 hours and 20 minutes flying time, or at the rate of about 71 miles per hour for the entire distance, flying against head winds and eneountering several thunder storms which made it necessary to detour eonsiderably from the direct route and contributed to the slow average speed for this flight. Considering these obstaeles, however, the planes were able to make mueh faster time than had heretofore been possible with the heavy, bulky pontoons, which were left at Caleutta.

The flight landed in perfect condition at Allahabad at 12:50 p.m., ready for the flight the next day to Ambala. Just before sunrise on the morning of July 1, the three airplanes of the Ameriean expedition eireled over the airdrome and the eity of Allahabad and started northwest toward Delhi and Ambala, 530 miles away. It was originally contemplated that the flight would land at Delhi, but after Lieutenant Halverson, the advanee offieer for the fourth division, had made an inspection of the landing field there he deeided against the use of that airdrome on aecount of its restrieted area and the fact that the Royal Air Force were only using the field as an emergeney station. Aceordingly, the itinerary of the flight was altered to take in Ambala, 150 miles farther north, which had an exeellent airdrome and possessed every facility for the eonvenience of the flyers. The flight, however, passed direetly over Delhi, enroute to Ambala.

Through the Monsoon Belt and Deserts

The flight landed at Ambala after 5 hours and 20 minutes in the air, eovering the distanee from Allahabad at the rate of 93½ miles per hour, in spite of numerous thunder and rain storms which they were forced to pass through enroute. The flight passed through

that portion of interior India which is subject to the southwest monsoon in the summer and which is always accompanied by heavy electrical storms and torrential rains. Due to the terrific heat the engine in Lieutenant Nelson's plane cracked a water jacket, and although considerable water was lost before Ambala was reached, he landed safely and none the worse for his experience.

The landing field is within the cantonment of the British-Indian army. The officers of the Royal Air Force met the American flyers with the same cordiality which their brother officers had accorded the Americans at Allahabad. Every facility of the British airdrome was made available for the American aviators and the slight damage to Lieutenant Nelson's plane was quickly repaired.

On July 2, at 9:16 a.m., the world flyers left Ambala for Multan, flying along the fringe of the Great Indian Desert, which is largely embraced in the province of Rajputana. This flight was not accomplished without difficulty, although only 4 hours and 42 minutes were necessary to make the trip of 425 miles. A very heavy sand storm was encountered, and the excessive heat made flying difficult. Lieutenant Smith's report says that they landed at Multan safely, but very tired. The flyers again landed upon a British airdrome and were shown every courtesy.

On July 3, at 6:10 a.m., the American expedition left Multan and headed down the valley of the Indus toward Karachi, on the Arabian Gulf. The country which was flown over enroute is not subject to heavy rains and thunder storms like the Ganges Valley. Though the country immediately adjacent to the Indus is fertile and thickly populated, that portion which was traveled over by the flight is on the edge of the Great Indian Desert, and in pursuing a straight line the flight did for a distance of 100 miles cross over the eastern edge of the desert.

It was during this time that Lieutenant Nelson's engine again cracked a water jacket, and though a great deal of water was lost he finally landed safely at the Royal Air Force airdrome, east of the city of Karachi, where arrangements had been made for the landing of the flight by Lieutenant Halverson, the advance officer of the fourth division.

Karachi was reached at 1:11 p.m., July 3. Here the American expedition remained for three days, taking off at 6:30 a.m., July 6, for Charbar, Persia, and arriving there in the afternoon, the distance covered being 330 miles. The flyers left the same day for Bandar Abbas, Persia, also 330 miles distant.

IT IS hardly necessary for us to more than glimpse over the itinerary of the airmen as they made their way over the long trek through southern Asia and southern Europe and up to Paris and London.

Leaving Bandar Abbas on the morning of July 8 the flyers took off for Bushire, Persia, a distance of 400 miles to the west, and after a short stay here to refuel and to visit with the officials of the British Government who so kindly assisted the American globe-girdlers through this section, took off again in the afternoon for Bagdad, the city of Arabian nights, 475 miles on to the west. Aleppo, Syria, was the next objective 480 miles away and at dawn of June 9, they set out for this point following a course up the historical valley of the Euphrates, over the old city of Ramadi to Dier-Ez-Zor to the Musilmieh airdrome north of Aleppo. The flyers covered this distance in 6 hours, they having made remarkable time since leaving Bandar Abbas. They next reached Constantinople after a flight of 7 hours 40 minutes, finishing the fourth division of the World Flight route. They were prevailed upon to rest over Friday by Turkish aviation officials and on July 12, were again in the air making their way to Bucharest, flying over the route established in 1921 by the Franco-Roumanian air lines. While here the flyers made plans to get to Paris by July 14, the French Bastille, or Independence day and the distance of 1400 miles between the two cities was covered in two days, they going by way of Budapest, Belgrade, Vienna to Strassbourg. They stopped only a short time at both Vienna and Strassbourg although elaborate plans were made in both cities to entertain the airmen.

One hundred miles east of Paris the flyers were met by two groups of airplanes of the French army who escorted the world cruisers over the city, where they circled the Arc d' Triomphe out of respect for the military heroes of France, before proceeding to the Le Bourget airdrome—the great commercial air station of the French metropolis. There were over 5000 enthusiastic spectators awaiting the flyers at this point.

Two days later, on the 16th, the globe-circlers left Paris, and three hours later had negotiated the English Channel and were safely landed at the London airdrome —known as Croydon. Here again an enthusiastic throng greeted the American aviators. It is said that never before in the history of aviation has there been a more representative gathering of aviation enthusiasts than the one which met the world flyers upon their arrival in London. One of the first to greet Lieutenant Smith, the commander of the flight, was Mrs. Stuart McLaren, the wife of the gallant Englishman, who was also attempting a flight around the world in a single plane.

Facing the North Atlantic Wade Drops Out

From London, the flyers on July 17, left for Brough on the Humber River 150 miles from London, where the planes were given a complete overhauling and the flyers rested for their next gruelling journey over the north Atlantic. At Brough the planes were serviced by the Blackburn Airplane & Motor Corporation, which was designated as the main world flight depot in England. On July 30, with the flyers completely rested and the planes fitted with new motors, new wings and their landing gear changed back from wheels to pontoons for landing on water, they took off for Kirkwall, Scotland, a distance of 400 miles. It was here at Scapa Flow that the Germans sunk their great fleet as they were turning it over to the English after the World War. The partly submerged hulks were quite visible to the American flyers.

From Kirkwall, the flyers were confronted with the same conditions that existed in the north Pacific when it seemed at times that it would be almost beyond human endurance to continue the battle with the elements.

The next objective beyond Kirkwall was Hornafjord, Iceland, a distance of 560 miles. Shortly after leaving Kirkwall, Lieutenant Wade experienced engine trouble with the *Boston* and he was forced to make a landing in a heavy sea. After having been tossed about in the huge swells for several hours, he with his mechanic, Lieutenant Ogden, was taken from the plane by a passing fishing trawler. The U. S. Crusier *Richmond* rushed to the scene and attempted to hoist the disabled *Boston* on board but the heavy sea caused the ship to be considerably damaged in the attempt. It was then decided to tow it to the Faroe Islands, but after a brave battle, the plane succumbed to the ravages of the sea and sank. Lieutenants Wade and Ogden, dry-eyed, but broken in spirit, watched their sturdy machine submerge beneath the water and choked down a sob as they realized their hopes of completing the flight with the others was gone through a bit of ill fortune.

The other two planes arrived safely at Hornafjord.

From this point the ice conditions were extremely bad and presented a baffling problem to the advance officers who were trying to locate open places for the planes to land and to supply them with fuel. Several times the *Gertrud Rask*, a Danish vessel carrying Lieutenant LeClair Schulz, advance officer, tried vainly to penetrate the ice barrier off the coast of Greenland, and although the ship was especially constructed to battle the ice floes she was caught and drifted with the ice for days before she could release herself.

Unable to establish a base at Angmagsalik, nothing remained but for the flyers to attempt a flight of 750 miles to Frederiksdal, just west of Cape Farewell, the southern extremity of Greenland. Fortunately at this time of year the sun in this region remains above the horizon about 17 hours and during the remainder of the night a strong twilight prevails which made it possible for a flight to be made without undue dangers.

Lieutenant Clayton Bissell, who also assisting the advance men in this region, succeeded in establishing a base at Frederiksdal. Consequenlty the two remaining planes, the *New Orleans* and the *Chicago* attempted to take off for the long flight, but with the heavy load of

fuel the high seas caused considerable damage and a three-day delay was necessary until the *Richmond*, which was carrying supplies on to Greenland could return to Reykjavik. In the meantime Lieutenant Locatelli, with the Italian party, caught up with the Americans and was ready to take off with them on the next long hop to Greenland. The next attempt to take off was successful and throughout the day the anxious public on the American mainland listened to the scant news which filtered through that the planes were still in the air. At exactly 6:15 Greenland time, the two American planes landed at Frederiksdal, after 12 hours 55 minutes in the air. It was the end of the longest and most hazardous single flight of the entire route.

Flyers Reach America

THE Italian flyers, however met with sad misfortune and were forced down on account of dense fog when they were within 200 miles of Cape Farewell. For several days they drifted about helplessly in the cold, and after a long, fruitless search by various ships along the coast of Greenland the cruiser *Richmond*, by sheer fate happened to sight the stranded men in the ocean 125 miles east of Greenland. They had fought bravely to keep their plane afloat and they were rescued from what appeared a certain death.

The Americans reeled off another lap of their flight on August 24, when they skirted the Greenland coast for 125 miles and reached Ivigtut. Here the motors were again changed and the planes made ready for the next hop of 500 miles to Indian Harbor on the American mainland. A week later, on August 31, this last hop was accomplished, they having completed their flight from the old world to the new as they sped across the dangerous ice-bound stretch of water between Ivigtut to Ice-Tickle, a land-locked bay two miles north of Indian Harbor, Labrador. This flight was made in 6 hours 49 minutes.

Meanwhile Lieutenants Wade and Ogden, were being transported on the cruiser *Richmond* to Pictou Harbor, where another plane, the *Boston II* had been sent from Langley Field for their use in completing the flight with their comrades. The *Boston II* was the original world cruiser delivered by the Douglas Company, in which the world flyers received their preliminary training.

On the morning of September 2, the flyers left Indian Harbor and bucked a strong wind to Hawkes Bay, New Foundland. The following day they reached Pictou Harbor, where Lieutenants Wade and Ogden greeted their brother flyers in a touching scene. As Lieutenant Wade again grasped the hand of Commander Smith, he, for the first time since his forced landing near Iceland, broke down and cried.

The triumphant arrival on the afternoon of September 6, of the three world flyers at the Boston airport will go down in history as the most impressive sight of modern history. Landing on the historic waters of Boston Bay they were greeted by a salute of twenty-one guns, the national salute tendered only to Presidents of the United States, from anti-aircraft guns on the shore and by the cheers of the thousands assembled for the epochal event, which swelled into one mighty roar of welcome from all America.

Thus, on across the American continent the flyers journeyed over a virtual path of flowers. At each landing point, great throngs met them and showered them with congratulations. At Mitchel Field, at Washington, at Dayton, at Chicago, and at each point until they reached Santa Monica, the populace could not do enough in expressing their exhuberance over the singular success of the brave airmen. At Washington they were met by President Coolidge, and at Dayton the city went wild in showing due honor to the commander, Lieutenant Smith, and to the three members of the group which the city claims as virtually their own sons, namely, Lieutenants Leigh Wade, John Harding and Eric Nelson. These men were stationed at McCook Field prior to the world flight.

Thus after a lapse of six months and six days, the Round-the-World Flyers returned to Clover Field, Santa Monica, California, the place from which they started on last March 17, with 27,000 miles ahead of them.

World Flyers Arrive at Dayton—Reading from left to right they are: Major J. F. Curry, Commanding officer, McCook Field; Lieutenant Lowell H. Smith, Commander of the World Flight; Lieutenant H. H. Ogden, Lieutenant Eric Nelson, Lieutenant Leigh Wade, Lieutenant Jack Harding and Lieutenant Leslie P. Arnold.

THE CRUISE OF THE CENTURY

By Major General Mason M. Patrick

WHEN the World Flight landed in Seattle recently, the most conspicuous aviation undertaking since the War came to a brilliant close. The Flight is ended. There remains only to chronicle properly this remarkable exploit and to draw from it the lessons it has taught. The success of this Flight depended upon three things: The personnel, the airplanes, and the organization back of them to do the detailed planning with all which this entailed and to care for the distribution of supplies so that at no point should there be anything wanting.

With any one of these lacking this Flight would have been impossible. The personnel of this expedition consisted of pilots and mechanics. In the Army Air Service there was no dearth of either. In fact, the final choice was made more difficult by the large number available. All events transpiring since the Flight left Seattle have proved that those selected were well qualified for the work required of them. This little group, whose names have been on every tongue and are familiar to nearly every man, woman, and child in the country, has carried out its dangerous mission, brought it to a triumphant end, and is unspoiled by its successful accomplishment.

When the idea of circling the globe by air was first conceived, it was at once realized that we must have a suitable plane, one designed for the unusual requirements which would be demanded of it. The recital of a few of the many characteristics which the "World Cruiser" must possess will serve to illustrate the task confronting its designers and engineers. It must be capable of landing both on land and water; it must have a long cruising radius, particularly for crossing the Pacific and Atlantic Oceans, and other parts of the route where supply bases were widely separated by geographic barriers; it must be sturdily and staunchly built to withstand the rigors of all climates and the strain of more than 26,000 miles of continuous air passage. The type selected met well these requirements. Those who viewed these planes when they landed at Seattle at the end of the journey were surprised at their excellent condition.

More depended on the planes than is generally understood. In past exploration and discovery the result was largely dependent on the personnel. Early explorers, when one mode of travel failed, seized another method of transport and pushed on, the final result depending upon the resourcefulness, stamina, and courage of the individual adventurer. In this Flight, however, the planes were the only vehicles which could be employed and unless they could stand the strains to which they were subjected the task given the pilots could not have been completed.

But even with such excellent personnel and equipment this circumterrestrial journey through the air was an impossibility without an adequate, efficient organization behind them. All too frequently we overlook these men "behind the scenes"—they who plan and work without any hope or desire for personal recognition or glory that others may succeed. Upon them fell the burden of selecting the planes, securing the cooperation of other bureaus and departments of our own Government and of all the foreign nations whose realms were traversed; selecting the route, establishing the landing places, and shipping the supplies to all the odd corners of the earth where our Flight was forced to stop. In short, this little group was the General Staff, the Signal Corps, the Quartermaster Corps and the Air Service Supply Division for this mite of an army which was sent around the world; and yet I doubt if a score of men in or out of the Service could recite their names. However, I know them and give them credit for the admirable manner in which they performed their task. They began work long before the Flight started, they will be at it long after the Flight is ended. But they have worked with a purpose and their work has been well done.

This outlines the method of accomplishing one of the most important single military missions since the War. A few words may not be amiss as to the influence of this Flight. It has taught a number of worth while lessons. From a military standpoint, this Flight has shown that no distances or no difficulties are great enough to make any country immune from attack by aircraft. On the other hand, this same Flight has shown how communication between the nations of the World can be improved, how parts of the earth otherwise almost inaccessible or without sufficient means of transportation and communication can be brought nearer, thus enabling men and nations to know each other better, so that aircraft, while potent engines of war, may likewise go far toward bringing about the much desired era of universal peace.

—Courtesy U. S. Air Services.

What Does the World Flight Prove?

Lessons Gleaned from Epoch-Making Journey Will Help Future of Aviation

By Wm. A. Mara

THE 27,000-mile adventure of Lieut. Lowell Smith and his companions of the Army Air Service is drawn to a successful conclusion. These intrepid flyers who have been called "Magellans of the Air" have written another bright page in the history of American aviation and another dazzling record has been added to our already long list. They have proven beyond doubt that it is possible for man to girdle the globe by air.

But what does this flight mean to the development of commercial aviation in this country? In the past month I have been asked many times, "What good is the Round-the-World Flight from a commercial standpoint?" and "Why was the flight undertaken?" and "Could not a like amount of money have been spent to better advantage?"

Interest in Flight Was Widespread

The men who asked these questions were not attempting in any way to belittle the wonderful record of Lieutenant Smith and his companions. They were proud that America had been the first nation to fly around the world and felt that this fact alone made the flight well worth while, but apparently they wanted to know what it all proved and what the next step would be. Let's check up and see if we can find the answer.

When General Mason M. Patrick, chief of the army air service, announced the preparations for the flight, he said that the purposes were: to demonstrate the feasibility of establishing aerial communication with all of the countries of the world; the practicability of travel through regions where surface transportation did not exist, or at best was slow and tedious; to prove the ability of modern types of aircraft to operate under all climatic conditions; to stimulate the adaptation of aircraft to the needs of commerce; to bring before the people of the world the excellence of American products in the interest of our American aircraft industry, and lastly to bring to the United States the honor of being the first nation to fly around the world.

Much that the general hoped for has been accomplished, and let me point out right here that so far as flyers were concerned there was never any grave doubt that the attempt would fail. But the flight has proved other things and points the way to still others.

Sort of Super-Aerial Glidden Tour

Every Detroiter will remember the Glidden Tours of the early days of the automobile. These tours did much to hasten the practical development of the motor car. The world flight offers a parallel. In effect, the flight has been a sort of super-aerial Glidden Tour, much more complicated and dangerous, and therefore more worthy of accomplishment. Like the Glidden Tours the world cruise has been a test of the reliability and endurance of the modern airplane and its engine under the most trying conditions. It has been convincing because no freak or special types of planes were used. They were stock models remodeled to have greater gas carrying capacity.

The Douglas planes used are of conventional biplane design and are powered with Liberty engines. Their most noteworthy feature is their carrying capacity. The flight indicates that fire hazard in airplanes has been practically eliminated, shows that the airplane has excellent commercial possibilities, proves the reliability of fusilage design, and indicates that there are possibilities for further development of engines.

Any man who has flown in an airplane knows how comforting is the sound of a smooth running motor. When the motor stops one must come down. Therefore the basic idea is to keep the motor running. On the world flight engines were changed six times. This does not mean that the six engines were worn out, but rather that danger was in large part eliminated by the installation of fresh powerplants at intervals. Only one of the four planes was put out of the running through an engine failure, although Major Martin was forced down temporarily because of engine trouble off the shore of Kantak.

The world flight gives us two opportunities to chuckle at the expense of our English friends, although this is not mentioned as one of the advantages of the flight, but rather to show the advance in American engineering and operating skill.

American Ahead of English Engineers

The first chuckle deals with the elimination of fire hazard to which reference has been made. When Lieut. Eric Nelson and his mechanic landed

Continued on page 30

Walter Brookins—A Pioneer Aviator

The Brookins Manufacturing Company of Dayton, Ohio, makers of the famous Brookins Measure with the flexible metal nozzle has a significant connection with aviation which some people possibly do not appreciate.

Walter Brookins, head of this growing concern, is one of the very first pioneer aviators of the world. His early flying exploits with the Wright Brothers is familiar history to all persons who have followed aviation, and his name is linked with such early well known flyers as Arch Hoxsey, Ralph Johnson, Hubert Latham, Alfred Leblanc, Grahame-White, J. Armstrong Drexel, Charlie Hamilton, Emile Aubrun, Roland Garros and others of the "good old days" back in 1910.

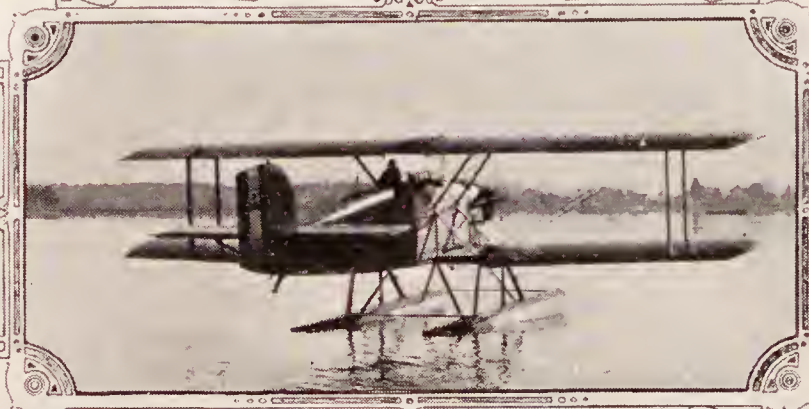
It was in this year that the Gordon Bennett Races (Corresponding to the present day International Air Race Meet) was held at Belmont Park, New York. The Wright Brothers had spent several months designing and building a new plane—the fastest in the world, to enter in this meet. It had shown 90 miles an hour in preliminary trials. Walter Brookins was slated to pilot the speed ship.

During the race a connecting rod broke on the engine and a forced landing was made in a 30-mile wind. The plane nosed over several times but needless to say our gallant Walter was not seriously injured. The French flyer Leblanc also crashed in this race. "Them was the great old days," says Walter.

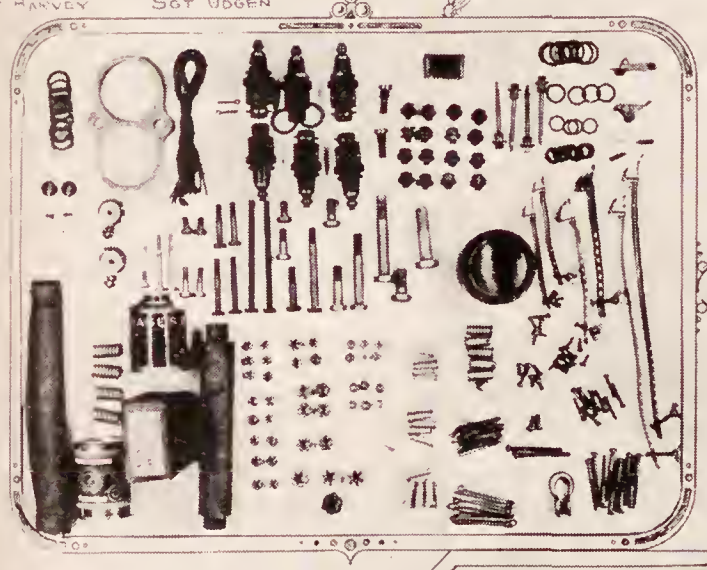
The Brookins measure is now part of the standard equipment of all up-to-date garages, filling stations, and airdromes. Of course, like all clever ideas others have designed to imitate it as in the case of the Wright Brothers plane, but the Brookins Measure is far superior with its thumb-controlled valve, and the special rim at the top which prevents the mussy spilling—an imposition on the customer. If it is not labeled "Brookins" it is not genuine. Demand the Brookins Measure.

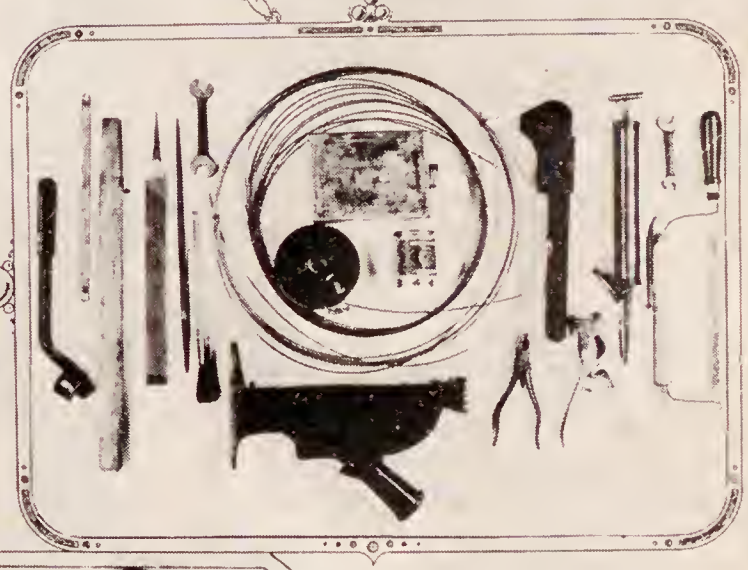
EQUIPMENT CARRIED BY ARMY PLANES FLYING AROUND THE WORLD

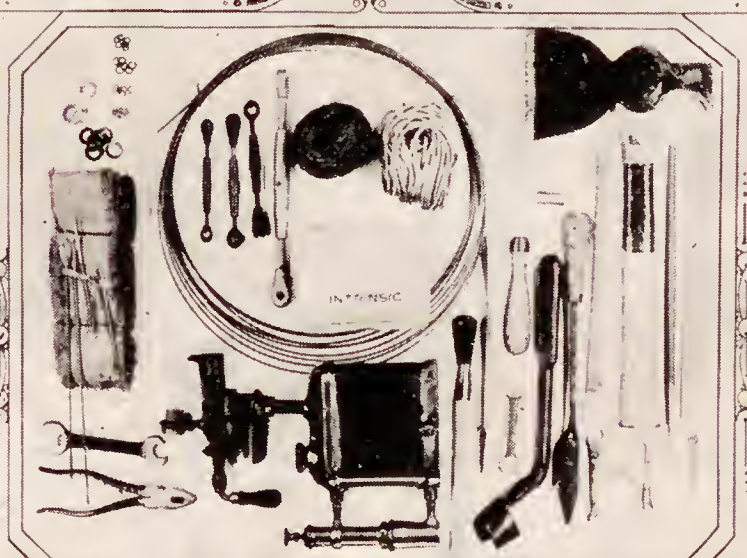
LEFT TO RIGHT -
LEUT HARDING
SGT HARVEY SGT ODGEN

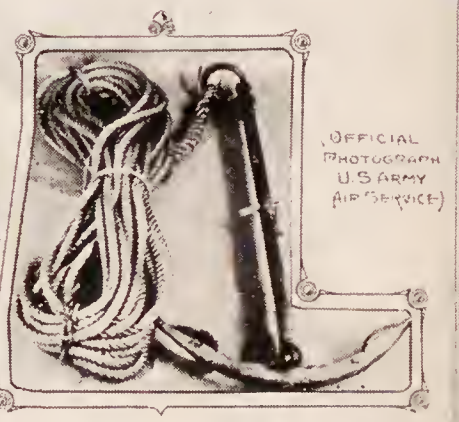


GROUP
- LEFT TO RIGHT -
MAJOR MARTIN —— LIEUT. SMITH
LIEUT. ARNOLD - LIEUT. WADE
LIEUT. NELSON









OFFICIAL PHOTOGRAPH U.S ARMY AIR SERVICE

11437 A.S.

The accompanying illustration will give one an idea of the type of equipment carried in the supply kits prepared for the World Flight. A number of these kits were sent to the various supply depots along the route together with airplane spares, Liberty Engines, propellers, gasoline and oil. All fuel used on the flight was furnished by the Standard Oil Company. Thirty-five Liberty Engines were overhauled at McCook Field, Dayton, Ohio, and all shipments of supplies made under the direction of officials of Wilbur Wright Field (F. A. I. D.)

WHAT DOES THE WORLD FLIGHT PROVE?

Continued from page 27

at Croydon Field near London and the crowd assembled to bid the flyers welcome, there was amazement and a thrill when the mechanic calmly ducked his head well down into the cockpit and lit a cigarette. In England this simply isn't done, because bumping over the field after making a landing has a tendency to shake up any gasoline which might escape, and the cockpit of an English airplane isn't considered a gentleman's smoking room in any sense of the word, in fact it is thought to be akin to suicide to attempt anything of the sort. In consequence a great sigh of relief went up when the mechanician appeared undamaged and the machine failed to burst into flames. So far have we progressed in fire prevention engineering in aircraft.

Again at the same Croydon Field bets were made by English flyers that the Americans would make bad landings and bounce and rocket across the field. At Croydon, as many U. S. flyers can testify, there is an abrupt ridge in the middle of the field, just exactly where a ridge ought not to be. It is a sort of trap for the unwary flyer and many English aviators have been known to strip their landing gears in negotiating it. Not so with our flyers. They spotted the ridge and, avoiding it, made perfect landings. The English pilots lost their bets.

Success of Flight Due to Preparations

The world flight would not have been possible without advance preparation, just as it would not be possible to operate railroad trains or steamships without terminals and docks where spare parts can be obtained and repairs effected. At the 55 regular stops in the 27,000 mile journey there were spare engines, landing gear, wings, and pontoons.

The flight also proves that landing fields and a system of airways are necessary to the safe, speedy, and efficient operation of planes. Because there were no landing fields in many of the countries, the flight was laid out over water and along the coast lines as much as possible. The journey across both oceans was slow, as was the flight through sparsely populated countries. In comparison with this consider the speed made from Calcutta to Constantinople, a distance of over 4,300 miles in 12 days, and the even better record established over the well-traveled airways of southeastern and central Europe. A month's journey by train and steamship was covered in less than two weeks. The

pilots refer to this leg of the flight as a pleasure jaunt.

The world flight brought out one fact of particular interest to Detroit where engineers are building airplanes and airships of all-metal construction. Metal is the last word in airplane construction and while the world-girdling ships were largely constructed of wood, the advisability of metal construction was emphasized in the flight from Akyab, Burma, to Calcutta, India. The distance was only 400 miles, but the flyers were obliged to land for refueling at Chittagong in the Province of Bombay.

They landed because the wooden pontoons had soaked up a great deal of water which increased the weight of the ships and thereby decreased their capacity for carrying gasoline. The heat and dampness of tropical countries also affected the wing covering and the lightness of the tropical air in comparison with our Ohio variety decreased the lifting capacity of the ships.

These are the facts. Now here are the lessons they teach.

First: Metal pontoons must succeed wooden ones, for metal does not soak up water and increase weight.

Second: Wings of wood and cloth must be replaced by wings of metal (duraluminum) which will not be affected by rain and dampness.

Aerial navigation has always been hampered more or less by the inefficiency of the compass which has a tendency to deviate. A new type of compass was given a severe test on the world flight and from all accounts functioned well. At any rate the flyers were never lost and always managed to find their objectives even though they were obliged at times to fly through the densest sort of fogs, over stretches of Arctic waters where a mistake might have meant death.

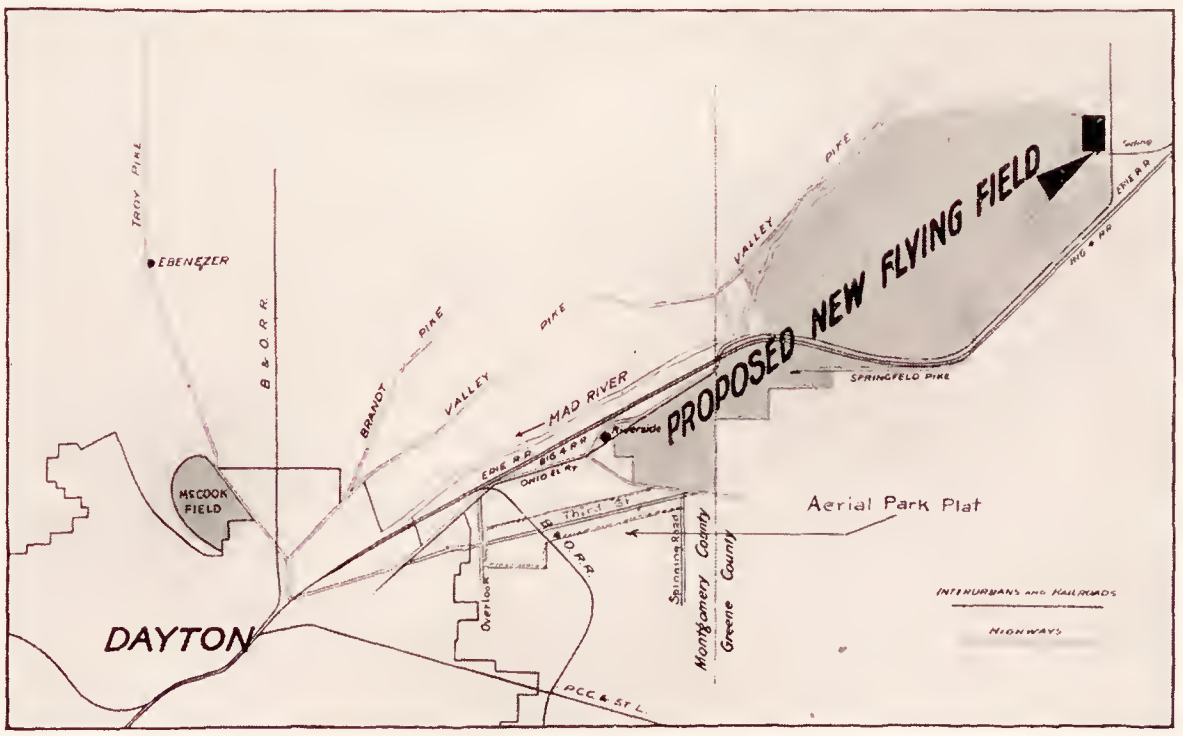
The feat of Lieutenants Kelly and Macready in flying from New York to San Diego, 2,600 miles, without stop, prompts the query, "Why did the world flyers make such short hops? Why didn't they fly 2,600 miles at a stretch?" The answer is that men and engines could not stand a steady daily grind of this sort, and safe, conservative flying meant shorter hops, with time to inspect and repair the machines.

So much for what the world flight proves. Reliability and endurance; lessons in construction and design; front page publicity which has centered the attention of the world on aviation have been among the principal benefits, plus the splendid history-making record which belongs to America.

McCook on New Site Assured for Dayton

ALTHOUGH an eastern aviation journal still fills its editorial columns with adverse propaganda toward the plan of the Government to move the Engineering Division, Air Service (McCook Field) to a new site near the present location presented by the citizens of Dayton, the decision of the Government officials has not been changed. The new site has been accepted by the Government and in due time the change will be made.

President Coolidge is the first President who has shown and expressed more than a casual interest in aeronautical development. The fact that aviation has lagged in this country since the World War is due primarily to lack of encouragement from the Government. First of all, this country needs to maintain in some sensible degree at least, a division of aerial defense. Certainly we cannot afford to let the most important factor in modern warfare lag for the sake of so-called "economy." Once the Government takes on a more active interest from the standpoint of national defense the commercial phase of the industry will as matter of course take on a more confident aspect. Major General Mason M. Patrick, chief of the Army Air Service, is asking for $23,000,000 to carry on aviation development during the fiscal year of 1925. This sum is a big increase over the amount allowed by Congress during the last several years but barely enough to carry out plans of vital importance in the program of the Army Air Service.



Map showing location of the 4,500 acre tract presented by citizens of Dayton to government to be used as permanent site of McCook Field and Wright Brothers Memorial. The Dayton Properties Company has opened a new residence plat known as Aerial Park near the new Flying Field site, and a rapid real estate development in this vicinity is taking place.

It is hoped that President Coolidge will insist that the budget of the U. S. Air Services be given a more liberal consideration. Should Congress again clip down the air service fund to a mere starvation figure, it will certainly bring to light that there is something other than logic and common sense being followed in the final judgment.

It was with intense satisfaction that Dayton people finally waylayed the various obstacles and had their new site for McCook Field formally accepted by the Government.

Frederick Patterson, chairman of the Dayton Air Service Committee, betook himself to Washington personally and on behalf of the citizens of Dayton made the gift of the new site to Secretary of War Weeks, acting for the Government. War Department officials were so elated and pleased with the gift that they escorted Mr. Patterson to the White House where he was most cordially received by President Coolidge and asked by the President to convey his thanks and appreciation to the people of Dayton. When Mr. Patterson was about to leave for his return to Dayton he was handed the following autographed letter from the President:

"My dear Mr. Patterson:

"It was a genuine pleasure to receive this morning the call of yourself and your associates of the Dayton Air Service Committee who were brought in by General Mitchell to tell me about the conclusions of the transactions which make the McCook Field at Dayton the property of the United States Government. In making this splendid gift to the country, the citizens of Dayton have been inspired alike by motives of high patriotism and also of pride in the fact that Dayton was the home of the Wright brothers, and that there, through their talent and tireless efforts, aviation had its birth.

"McCook Field will always be famous as the first of those training fields and terminals for aviation which now are scattered throughout the entire world. Upon it is reflected a full share of the glory won by thousands of American and other aviators who were trained there. It has been the scene of splendid services alike to the cause of science and to the national defense. The people of Dayton, in presenting this historic tract of 4,500 acres to the National Government have insured that it will always be maintained for the services that has won it fame.

"You have enabled the creation of McCook Field into a perpetual monument to the men who first realized the full possibilities of navigating the air, and to that great first generation of inventors and aviators whose services and sacrifices in the war and in the works of peace have made their list a roll of heroes.

"You have informed me that the transactions incident to transferring McCook Field to the National Government are now completed. I am writing you because I want in this formal manner to record the Government's appreciation of this fine act, and to set down the assurance of my personal congratulations to the people of Dayton and my gratification at having had a small part in it.

"Most sincerely yours,

"CALVIN COOLIDGE."

DAYTON WIRE WHEELS DEPENDABLE PRACTICAL TESTS SHOW

Wire Wheels manufactured by the Dayton Wire Wheel Company of Dayton, Ohio, have played their important role in every noteworthy accomplishment of both the U. S. Air Services and Civilian manufacturers. We base this assertion upon the fact that over 99 percent of all wheels used on airplanes of American make are turned out by this well-known Dayton concern.

On the Transcontinental Flight of the famous T-2, Dayton wheels were placed upon the overloaded monoplane.

Again, on the Dawn-to-Dusk Flight of Lieutenant Maughan it was Dayton wheels which were chosen for installation on the diminutive Curtiss Pursuit which ship was chosen to make the epochal race with the sun in traversing the North American continent from Long Island to San Diego, California.

And then came the World Flight, when extreme caution and preliminary tests were necessary to assure the absolute dependability of every vital factor of the World Cruisers. Without question Dayton wire wheels were selected and found most reliable for installation on the four new ships which were to start on this most gruelling test which any aircraft had been called upon to undergo since their inception.

Some few weeks ago when the World Flyers landed gracefully at McCook Field amid the din of the thousands who had congregated there to welcome the brave airmen upon the successful consummation of this great undertaking the McCook Field engineers plied questions to the airmen concerning the performance of the ships, the special equipment, etc., in connection with which they had contributed an active role. The Instrument Branch engineer was there asking about the new compass, the Power Plant man was there inquiring about the performance of the "new riffle" which they had installed on the Liberty, and incidentally the Material Section official was there to learn about the condition of the metal parts in the frame, etc. "How did the wheels stand up, Eric?" the question was put to Lieutenant Eric Nelson, engineer officer of the flight. "Well," dryly, replied, the "flying Viking," as he has been inadvertently termed, "if everything had stood up as well as those wheels we would have finished this flight in less than schedule time."

We might recall another incident of a few weeks ago during the International Air Races, in connection with the first bomb-carrying weight test of the great Barling Bomber—largest plane in the world.

Here Dayton wire wheels saved the day and the famous plane was preserved from serious damage during a bad landing.

With the heavy load of over 4000 kilograms the ship piloted by Lieutenant H. A. Harris was trying for a weight-carrying record. She had remained in the air several hours and climbed to a height of some 4432 feet when dusk began to settle and a landing became necessary. In the semi-darkness a small ditch was struck in landing, whereupon, it is stated by witnesses at Wilbur Wright Field, that the huge plane rebounded almost the height of the hangars. Upon examination it was found that the undercarriage had not suffered a particle. Dayton wire wheels had withstood the shock.

Practical demonstrations such as the ones noted should be enough to guide any fair-minded aircraft manufacturer in his quest for dependable wheels. In fact the Dayton Wire Wheel Company has built up such a strong prestige in air circles that no other concern of the kind can successfully compete with it.

The company maintains a competent and courteous engineering department which is always ready to advise and assist builders of aircraft in the construction of specially designed wheels and there is no other concern of the kind in the country which is equipped to handle in the right manner such orders, whether of large or small proportions.

Of course, the Dayton Wire Wheel Company does not deal exclusively in the manufacture of aircraft wheels but also makes all kinds of wheels for automobiles. Incidentally when L. Corum and Joe Boyer brought "No. 15" under the wire at the Indianapolis speedway last May 30, it rode in on Dayton wire wheels. Thus "for the man who drives, or the man who flies" there is a wonderful sense of security and satisfaction to know that their vehicle is equipped with Dayton wire wheels.

MATTHEW'S, OUR LEADING FLORIST

Among the most interesting places to visit on our main thoroughfare is the establishment conducted by one of Dayton's well-known and popular citizens, W. G. Matthews, which is located at 221 North Main Street.

Here the visitor will find a most beautiful display of almost all varieties of flowers, including roses, carnations and chrysanthemums, all fresh and fragrant, and suitable for all purposes, while the atmosphere is laden with fragrance from nature's delicate and unequalled offerings, which may be seen here in all their pristine glory.

Mr. Matthews is an artist in the line of floral and funeral designs and his creations in that line are the most artistic to be had in this section while the prices are always right. Those of our readers who desire special designs for weddings, receptions or funerals will find it to their interest to give Mr. Matthews a call. Slipstream cannot fail to compliment him for the high standard of excellence he has always maintained in the conduct of his business. Personally Walter G. Matthews is so well and favorably known in Dayton that any personal remarks are unnecessary but we cannot fail to state that he is heart and soul for aviation and a firm believer in Dayton's future as the aviation center of the country.

AERIAL PARK SUBDIVISION

One of the finest residential sections of Dayton opened up to the public adjoins the new flying field.

The active and substantial development of Dayton from a realty standpoint augers well for the future growth of the city. It is not a spasmodic boom of short duration but a steady and vigorous extension, due to an abiding faith among our citizens of Dayton's continued progress along the twin paths of peace and industry. As regards the above it may be pertinent to state that the location here of the new Government flying field has had a most stimulating effect upon those of our citizens who are firm believers in the idea that aviation is fast becoming one of the world's leading industries with Dayton as this Nation's center, and the belief is general that aviation will be to Dayton what the automobile has been to Detroit and what the motion picture has been to Los Angeles.

It may prove of interest to our readers to know that real estate which sold in Detroit prior to the advent of the automobile for about twenty-five dollars per front foot today sells as high as five hundred dollars per front foot and this in the course of twenty years or less.

With acceptance by the Government of the new flying field, which is located close to the Dayton city limits a bright future is assured Dayton from an aviation standpoint and realty holdings adjacent to the new field have become among the most desirable and most sought for in this vicinity. This is noticeably true of the Aerial Park Subdivision which has recently been opened to the public by the well known Dayton Properties Company and the demands for lots in this highly favored subdivision has exceeded all expectations. Aerial Park will be paved and improvements installed. The ground is virgin soil, the topography insures perfect drainage and the outlook affords wonderful views of city and country.

It is located ten minutes from the heart of the city on the direct route of the new Government flying field and is from every conceivable standpoint in the aviation district. We can assure our readers that it gives not only the finest home location but one of the safest, soundest and sanest realty investments in Dayton at the present time.

McCook Engineers Laud International Tool Company

The concern which is able to handle a Government Contract in connection with Air Service material must be capable of performing two very important things: First, they must be equipped to turn out a product which is absolutely without fault in the utmost degree: second, the organization must be conducted upon a basis which will permit of low priced production.

As for the first requirement, the Air Service Engineers at the McCook Field Experimental Station are so exacting in their inspection that the least flaw in the make-up of the product would be enough to cause a rejection of the article. This ruling is necessary in all Air Service work in view of the fact that human lives are at stake.

As for the second requirement, it will be remembered that all Government Air Service Contracts are let on sealed bids, the lowest bidder being awarded the contract. However Air Service Engineers first determine whether or not the concern is adequately equipped to perform the work and deliver it within the specified time. Though this ruling has not been rigidly inforced, especially during the war period when graft held complete sway in such matters, it will soon be very difficult for other than first class concerns to bid on Government work.

Lately the International Tool Company, a Dayton, Ohio, plant took over a substantial order from the Army Air Service in the manufacture of Airplane Engine Controls.

McCook Field Engineers are high in their praise for the character of the work delivered by the International Tool Company and state that it is one of the few instances where a concern shows a conscientious interest in turning out only A-1 products.

The officials of this plant are also praised by the McCook Field men as being proficient and familiar with all phases of tool work which require high precision.

The First Good American Light Plane

On page one of this issue there is shown a photo of the Driggs-Johnson light plane which won the Dayton Daily News Trophy race at the Dayton Air Race meet held October 2, 3, 4.

This diminutive ship is one of the first of its type to be constructed in this country and was built primarily for the entry in the Dayton Daily News and Dayton Engineers' Club races at the International Race event.

In Europe light planes and gliders furnish one of the most important sport items in aviation circles and foreign journals use a great amount of space in explaining the characteristics of these "flivvers" of the air, which it is generally hoped, might soon fill a practical place in civil aeronautics.

The Dayton Races brought out several interesting types of light planes but the Driggs-Johnson proved by far the most interesting and certainly the most promising from a practical point of view.

The designer of the "DJ-1", Mr. Ivan H. Driggs, is an engineer of wide experience having been formerly assistant chief engineer with the Dayton-Wright Company under Col. V. E. Clark. The DJ-1 is therefore not an amateurish attempt and all constructive work, excluding the motor was carried on in the shops of the Johnson Airplane and Supply Company of Dayton, which firm carries in its large store house myriads of all kinds of material for building any type of ship.

The DJ-1 has proven so popular and its flying qualities are so beyond expectations that numerous inquiries have been received at the Johnson plant asking for data on light plane construction.

Fortunately the Johnson firm is well equipped both to supply such data and furnish all kinds of equipment for building similar light planes; A letter to their Dayton, Ohio, headquarters will get the prospective light plane builder all of the information he requires.

In the December issue of Slipstream a complete description of the Driggs-Johnson light plane will be given along with several photos which will show the clean lines and other interesting features of this little ship.

If you don't get Slipstream regularly, let us send you a sample copy of the December issue.

—The Editor.

'Round the world with Valspar!

AMERICA'S air pilgrims were coming. At Mitchel Field, Long Island, a great crowd assembled to greet them. As the planes roared overhead, says the New York *World* (September 9), the Prince of Wales turned to Admiral Plunkett. "A fine flight," he said. "Are these the same planes that circled the world?" The Admiral nodded. "The same engines?" asked the Prince. "Well, some parts are new," replied the Admiral. "But the bodies are the same?" persisted the Prince. "Yes, the bodies are the same."

Of course. The bodies of these sturdy Douglas biplanes were finished from stem to stern with Valspar! And despite the terrible conditions to which the planes were subjected, the original Valspar finish remained intact—without cracking, blistering or turning white. Small wonder that Valspar is universally recognized as the ideal varnish for airplane use.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

Crowds greet the Round the-world planes at Boston. Above—The fliers and General Patrick at Mitchel Field.

Photos by Underwood & Underwood and Int. News Reel.

FYR-FYTER PROVES SUPERIOR

Not so long ago at one of the larger Army Air Service Posts, an order was issued for the Fire Chief to make a thorough inspection of all fire equipment.

Due to the unusual fire hazard in the presence of temporary war-time buildings the hangars, frame office, and shop buildings were well provided with fire extinguishers made by a highly advertised American concern. When the investigation was conducted it was found that a large percentage of these extinguishers of the small hand type were heavily corroded and not in serviceable condition.

In many of the departments where hundreds of clerks were stationed in a veritable fire trap these small extinguishers furnished the only immediate means of protection and a small blaze which might have been put out with the aid of a dependable hand extinguisher would have spread over the temporary frame structures before more adequate fire apparatus could be brought to play.

But these extinguishers installed during the war period were worse than worthless for they had misled the Fire Department into the belief that they would be ready for service in case of any local blaze.

It is significant to state that since the late order for an inspection was put into effect that a greater portion of the old extinguishers were condemned and Fyr-Fyters installed in their places.

Fyr-Fyter Extinguishers manufactured in Dayton—The Birthplace of the Airplane not only are used in the various Government Posts to protect the buildings but are used universally by both the Government Air Service and Commercial Aircraft concerns as a standard equipment on the planes.

It is folly indeed for any airplane owner to risk going into the air without a good dependable hand Fire Extinguisher—and there is only one, The Fyr-Fyter—installed within easy reach from the cockpit.

Fyr-Fyters are preferred by aviators because they can always be depended upon to be in perfect working order when an emergency arises.

The Fyr-Fyter Company is one of Dayton's most progressive and flourishing concerns. They have a fine new factory building and one of the best sales organizations of the middle west.

Slipstream bespeaks a hearty endorsement for the Fyr-Fyter to all of its aviation friends.

WHITMER BROTHERS

Among the various professions which are represented in Dayton none are more exacting than that of which Rollo R. Whitmer is a leading exponent. The essential qualifications which are necessary in the successful prosecution of the arduous duties incumbent upon the modern funeral director are in a striking manner exemplified in the professional career of this gentleman and all whom have had the benefit of his services speak in the highest terms of his skill and considerate regard in all cases where he has been called upon to officiate.

During his professional career in this vicinity Mr. Whitmer has conducted in a most satisfactory manner many of our largest funerals in a way which has proven him to be thoroughly conversant with the intricate problems of his profession and this fact has made it possible for him to be called upon in almost all cases to take full charge of various funerals which have been entrusted to his care in the past. During his long and useful career of a quarter of a century he has at all times kept pace with the progress of his profession and uses the latest and most scientific methods in all his work.

Mr. Whitmer has at all times taken a laudable interest in the progress of his profession and has served as president of the Ohio Funeral Directors Association. He is a booster for the science of aviation and believes Dayton will with the flow of the passing years not only maintain but improve its present standing as the center of aviation. Personally Mr. Whitmer is a gentleman whom to know is to like and Slipstream takes pleasure in giving him special mention in the World Flight Edition.

THE DAYTON PAPER STOCK COMPANY

Among the essential industries of Dayton which is playing an important part in the economic life of the city is The Dayton Paper Stock Company, which under the progressive and energetic management of Leon Slavin has become a leader in its especial field in this section of the State. It may prove of interest to our readers to know that this concern is a clearing house for the paper mills of the Miami Valley and its extensive plant at West First and Conover Streets is a daily repository for the waste paper which accumulates in the city and which is here assorted, baled and shipped to the extent of over one hundred cars a month.

The wonderful success which has crowned the comparatively short business career of the company will necessitate an improvement of the present plant and in the near future its capacity will be doubled and the present force of fifty employees will be increased to approximately one hundred.

The Dayton Paper Stock Company is a great asset to Dayton from an economic standpoint. With the advent of the concern in the business life of the community a new force was created which reaches every home of the city as well as stores, printing offices and factories.

People now understand there is value in every piece of paper, every old newspaper and every magazine. The waste is reduced to a small margin and thousands of people through a regular collection are furnished employment and the wheels of industry are kept spinning. The advantages and benefits enjoyed by the community by having a plant like The Dayton Paper Stock Company is apparent to all. Visitors to Dayton often wonder why the city's alleys and streets seem to be so free from waste paper. Like the bird seeking particles of grain, there is some individual hovering about prepared to gather up the scattered bits of paper. All these activities are followed to a definite head and then the total collection of waste is taken to the big dumping depot—The Dayton Paper Stock Company. We may add that not only in Dayton, but from a radius of one hundred miles is this same collection of waste fostered and encouraged and the adjacent territory is gradually being enlarged.

The Dayton Paper Stock Company is operating along modern business lines and has proven one of Dayton's fastest growing business concerns. The direction of its affairs are in competent hands and all who may transact business with them are assured of fair and square dealings.

THE NEW AIRPLANE TYPE MOTOR OF THE NEW VELIE AIRPLANE SIX—A MOTOR SENSATION

While numerous improvements have been announced by the leading motor car builders of the country in connection with their new 1925 models it remained for the well known Velie Motor Corporation of Moline, Illinois, to create a veritable sensation among the motoring public in connection with the new Velie Airplane Six with its wonderful new airplane type motor. In the above connection we can state that it is a well known fact in engineering circles that the engine of the airplane must be absolutely perfect. The result was the airplane engine was made safe. It was built to last years and not require constant attention. The Velie Motor Corporation has taken this same type of engine and adapted it to the automobile. Every feature of the airplane type motor is strikingly reflected in the new airplane type motor of the new Velie Airplane Six. Overhead valves, because they insure smooth operation and economy; forced feed lubrication to guarantee the fact that every moving part of the engine gets a constant flow of oil; extra large main and connecting rod bearings to do away with vibration and provide long life. An engine of this type is quiet after many thousands of miles of service and the new airplane type motor of the new Velie Airplane Six has proven this by tests made by thousands of owners.

Taken all in all this car from every standpoint has only to be seen to be duly appreciated. It has new and distinctive body lines—beautifully finished. Genuine full sized balloon tires; hydraulic four-wheel brakes; disc type clutch, which is easily adjustable; extremely heavy main bearings, measuring much longer than is usual in an engine of this size and quiet timing gears, operating in oil.

That the motoring public is taking advantage of this new departure by the Velie Motor Company is self-evident. For some time the executives of the company had been planning the manufacture of a medium priced car with the same distinctive body lines that the public has been forced to pay several thousand dollars for in the past, plus the new airplane engine, and the fruit of their well directed efforts is the new Velie Airplane Six at $1,530, delivered here, a truly remarkable buy for this type of car that in the past has been quoted at double the price.

Those of our readers who may be interested should not fail to visit the show room of The Dayton Motor Sales at 220 North Main Street, where the new Velie Airplane Six is on display. The Dayton Motor Sales Company are the local representatives of The Velie Motor Company and are not only one of the most reliable automobile concerns in this section but also the oldest automobile agency in Dayton.

"KINSTLE" HAS MADE GOOD

It has been often said that the tailor makes the man, and we may add in that connection that the practical dry cleaner and presser of the period is an important and necessary adjunct in the making, for no matter how well made or stylish any garment may be there will come a time when cleaning, pressing and repairing becomes necessary to make the wearer presentable. The number of establishments conducted for the above purposes speaks volumes as regards the tidy habits of the people of Dayton but while they may be commendably careful in the above respect they do not always exercise the same care in the selection of the establishment which does the work, and as is well known a satisfied customer is a business concern's best asset. That assertion is strikingly exemplified in the business career of "Kinstle" the popular dry cleaner, who some years ago commenced operations on a shoe string and today operates one of the most modern plants in this section of the State for cleaning, dyeing, pressing and repairing all kinds of garments. Mr. Kinstle has gained hundreds of well satisfied patrons by the general excellence of the work turned out while his deliveries are up to the minute. In conclusion we advise our readers to give him a trial and we are sure they will be amply repaid.

Lieutenant John A. Macready—U. S. Army Air Service pilot ready to take off in the original Wright Brothers flying machine at the International Air Race Meet, Dayton, Ohio, October 4, 1924.

Are You Keeping Pace With Aviation ?

How many people, had they known ten years ago what they know today in the development of the Automobile, could have made an easy fortune.

How many village blacksmiths kept pounding away while the fellow next door sensing the change of affairs tacked up the sign "Garage" on his woodhouse and built up a thriving business almost over night.

Aviation is now in its infancy—It is passing an epochal crisis toward the great future it must ultimately attain.

Again we broach the question: Are you keeping pace with Aviation Development ?

Slipstream Monthly—The "Ace" among Aeronautical magazines is the one medium for the sensible fellow who wants to keep in touch with the real important things in Aviation circles

Slipstream is well illustrated and written in readable style.

SUBSCRIPTION BLANK

Slipstream Publishing Company,
401 Beckel Bldg., Dayton, Ohio.

Gentlemen:

Please enclosed find (Draft) (Check) (Money Order) to the amount of two dollars ($2.00) which entitles me to one yearly subscription to the Slipstream Monthly

beginning with the..... issue.

Name .....Street & No. .....

Town .....State .....

SLIPSTREAM

An Aviation Monthly

December
1924

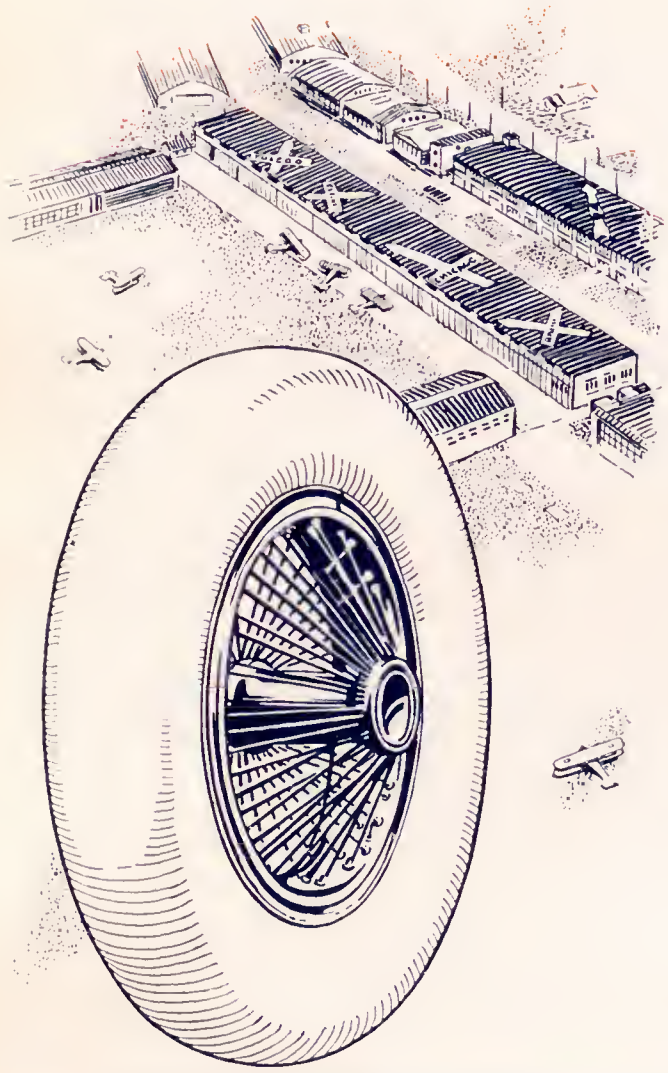
Light Plane Edition

HASENSTAB STUDIOS
DAYTON, OHIO

$2.00 PER YEAR

25¢ PER COPY

From Ocean to Ocean in One Day



McCook Field, Dayton, Ohio

ALL America was thrilled—and so were many in other countries—when Lieut. R. L. Maughan flew his Curtiss Pursuit Plane from the Atlantic to the Pacific Ocean last June.

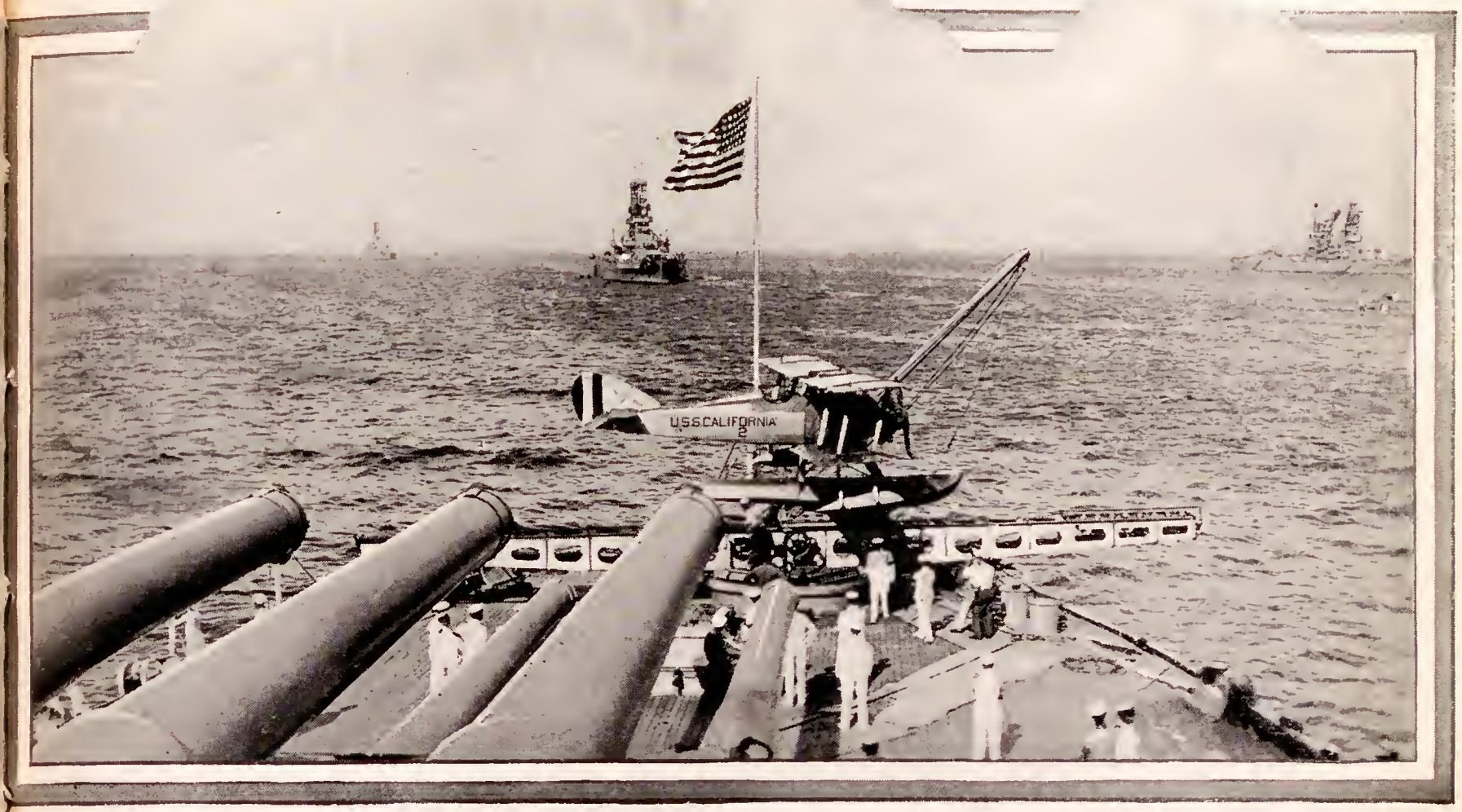
Great care was exercised in the selection of equipment for this epoch-making trip, and, as usual, Dayton Wire Wheels were the specified running gear to insure safe landings.

Whether a man is riding along through the clouds in a plane or ambling along over country roads in a car, it is vitally important that the wheels of his craft be capable of standing the stress and strain required. Dayton Wire Wheels are carefully designed and built with that end in view,—to give the fullest measure of service to—

"the Man Who Drives or the Man Who Flies"

The Dayton Wire Wheel Company
Dayton, Ohio

Dayton Wire Wheels
QUICK DETACHABLE



"Three to eight more miles per hour — with Valspar!"

For messages, combat, scouting, spotting—the airplanes carried on the vessels of the U. S. Battle Fleet require the maximum of speed for their small size.

Every slightest factor that might secure extra miles per hour was studied by the Bureau of Aeronautics in designing them. Even the effect of winds and air currents on various kinds of exterior finish! And experiments made by Lieutenant J. B. Barner, pilot in charge of U. S. S. California's aircraft, showed that with a finish of Valspar, three to eight miles per hour extra were obtainable.

Valspar is almost universally used for necessary coatings on naval aircraft. Its hard, smooth surface has not only been proved a speed factor, but has been found exceptionally durable. Absolutely waterproof, Valspar protects propeller blades, fuselage—any airplane part from rain, hail or fog. And it never turns white, checks or peels in spite of prolonged exposure or sudden changes of temperature.

Moreover, it is remarkably tough and elastic—withstands rubbing and excessive vibration. Valspar is recognized by all airplane designers as the unique varnish for airplane use.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

VALENTINE & COMPANY

Largest Manufacturers of High-Grade Varnishes in the World

ESTABLISHED 1832

New York Chicago Boston Toronto
London Paris Amsterdam

W. P. FULLER & CO., Pacific Coast

Slipstream

SLIPSTREAM—The stream of air driven aft by the propeller.

VOL. 5 DECEMBER 1924 No. 12

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879.

SUBSCRIPTION RATES:

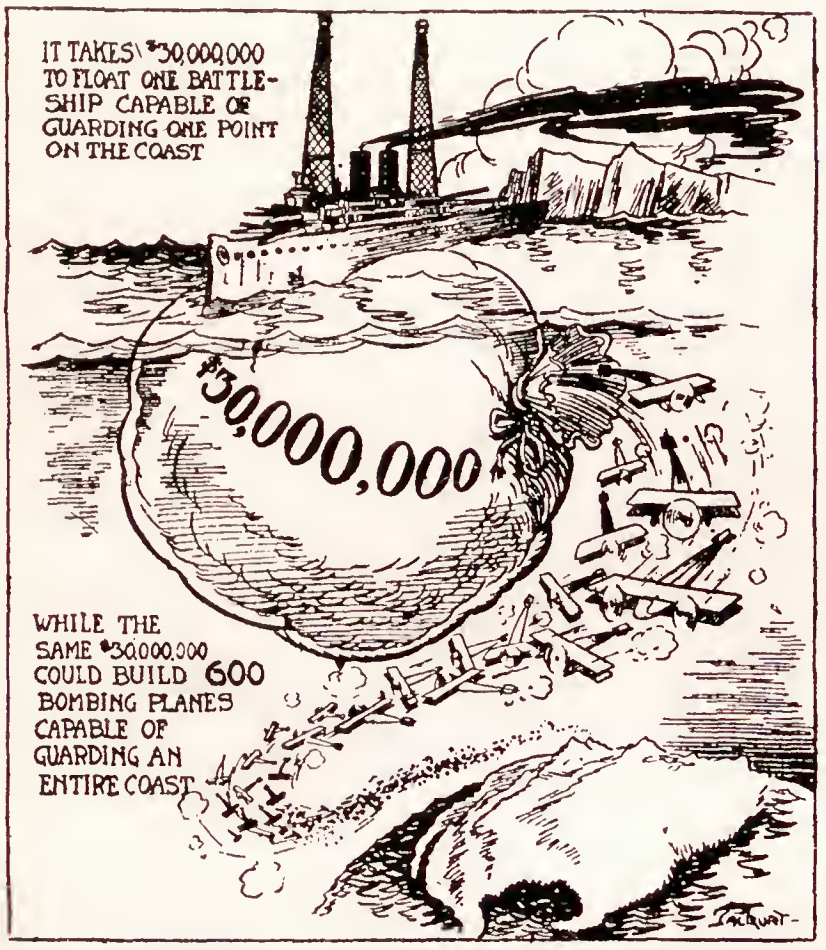
One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL---Editor CARL SANDSTROM---Advertising Manager

CONTENTS

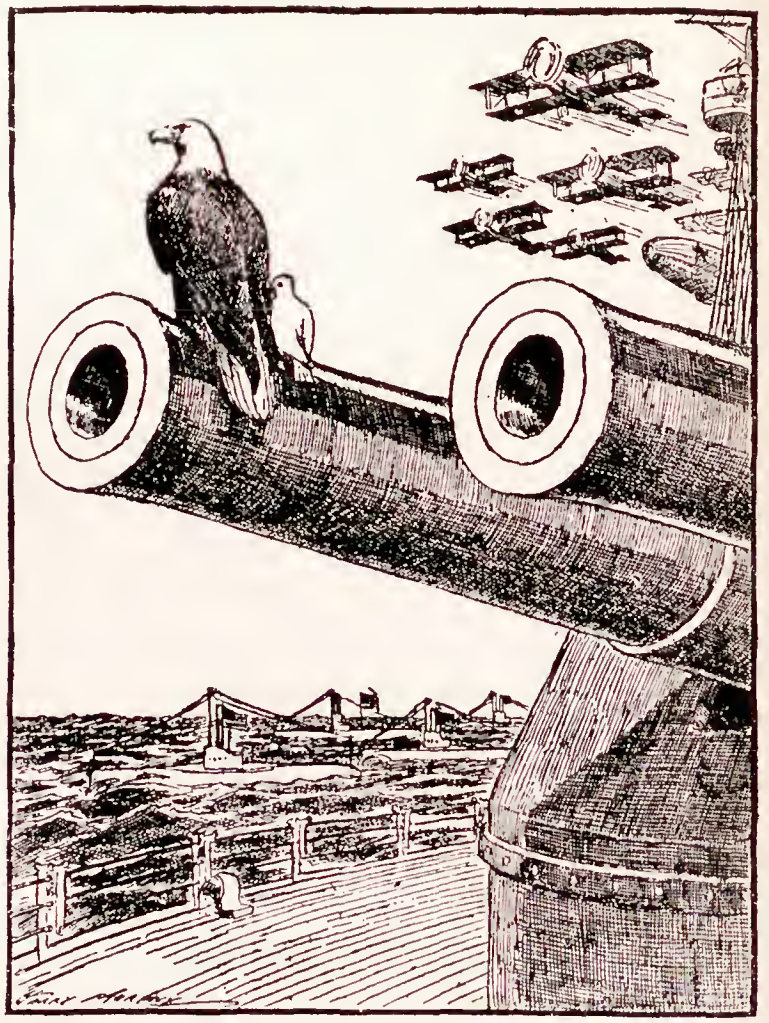
American Flight in Cartoon

And It's Your Money!



Talburt in Washington, D. C., Daily News

Peace, Perfect Peace



Murphy in Washington, D. C., Herald

Oh, Doesn't He Look Sweet With His Bobbed Wings!

Rogers in Washington, D. C., Post

Taking on a Few More Feathers

Smith in Middleton, N. Y., Daily Times-Press

The Slipstream Monthly

Published in Dayton, Ohio—"Birthplace of the Airplane"

FRED F. MARSHALL, Editor — CARL SANDSTROM, Adv. Mgr.

Vol. 5 — No. 12

-:- EDITORIAL COMMENT -:-

1925 Air Service Budget Favorable

A RAY of hope which has sprung eternal in the breast of the Air Craft Manufacturer of the United States, has taken on new life with the announcement of the President's Budget Message delivered to Congress on December 2, and which provides $18,287,000 for the purchase of new aircraft, engines and accessories.

The budget allows for a total expenditure of $65,000,000 for the various U. S. Air Services during 1925-26.

The message of President Coolidge is the first material indication that there are better times around the corner in the aeronautical industry of the United States.

After having watched the evasive, non-committal attitude taken by Congress in the face of all manner of press-fighting against it there is a great sense of satisfaction and elation in fact, to read the President's Budget Measure. It reads thus:

One of the most far-reaching measures intended to rehabilitate American air power is contained in the President's Budget Message delivered to Congress on December 2. It reads:

"Today the outstanding weakness in the industrial situation as it affects national defense is the inadequacy of facilities to supply Air Service needs. The airplane industry in this country at the present time is dependent almost entirely upon Government business. To strengthen this industry is to strengthen our national defense. For the Air Service of the Army and Navy, and the Air Mail Service, the estimates, including contract authorizations, amount to $38,945,000. This contemplates an expenditure with the industries of $18,287,000 for the procurement of airplanes, engines and accessories. The remaining $20,658,000 is for maintenance, operation, experimentation and research. The amount of $38,945,000, however, does not include all that will be available for this service in 1926. Amounts contributing to the Air Service carried in other estimates, and usable war supplies, will make a total availability conservatively estimated at $65,000,000."

The itemized estimates of the Budget, 1925-26, provide a total of $17,061,191 for the Army Air Service, $18,900,000 for Naval Aviation, $2,600,000 for the Air Mail Service, and $534,000 for the National Advisory Committee for Aeronautics.

Out of the Air Services estimates of $17,061,191 a sum of $14,911,191 is for direct appropriation and $2,150,000 for obligation by contract, as against a total of $14,476,619 available for 1924-25. "This will enable the Air Service," says the report, "to make reasonable progress toward cutting down its present shortage in heavier-than-air craft and at the same time assist in keeping alive the aircraft industry for use in time of emergency. In this estimate provision is made for initiating the removal of the Air Service activities from inadequate rented facilities at McCook Field, Dayton, Ohio, to a more suitable site in the same vicinity donated to the Government by private individuals."

Of the $18,900,000 estimated for Naval Aviation $14,800,000 is direct appropriation for aviation proper and $4,100,000 for obligation by contract to be appropriated in subsequent years. This increase from $15,150,000 for the current fiscal year is due, says the report, "to necessity of providing for a material increase in the number of new aircraft and also to furnish sufficient work to assist in maintaining the aircraft industry which should be kept alive because of its importance as part of the national defense program."

The estimate for the 1925-26 Air Mail appropriation, $2,600,000, includes a reduction of $150,000 with respect to the current fiscal year.

The estimate for the 1925-26 National Advisory Committee appropriation, $534,000, includes an increase from $457,000 to $522,000 for operations, and a reduction from $13,000 to $12,000 for printing and binding. The increase of $65,000 for operations provides for an additional laboratory building at Langley Field, Hampton, Virginia, at a cost of $40,000, an increase from 115 to 129 employees in the field service at a cost of $30,955 and a net reduction of $5,955 for miscellaneous expenses. "The additional personnel," says the report, "will provide a service test section to take care of special investigations for the War, Navy and Post Office departments without interfering with the carefully planned programs of research into the more fundamental problems of aeronautics."

Should the World Flyers Be Rewarded by the Government?

THE one strong advocate of justice in this country is the press. Things can go just so far against the general public's wishes until eventually its sentiment is given vent in the columns of current literature and if this sentiment is strong enough it always wins out.

Now, for the present time, public derision is centered toward the "bum" Army ruling which not only prevents the World flyers from gaining a promotion for meritorious service, but actually permits certain of these brave boys to be demoted.

Looking into the matter a little more closely, we find that the fault is not directly, at least, with Congress, not with the Air Service, but with the Army itself, and this fault in its organization not only affects the World flyers but any soldier who performs signal service worthy of special recognition.

Army promotions (the Army Air Service be-

ing considered as a division of the Army) are based on seniority. Thus, if a major of the Air Service gets killed in a crash, some senior captain in the Quartermaster Corps may get the promotion by stepping into his shoes as the next in line. The junior Air Service officer therefore has the long line of officers in the other various branches of Army to consider when he thinks of getting a higher rank. Efficiency and unusual service of any kind he might perform, counts for naught. He must wait his turn.

Now when the public was informed that according to the Army regulations it was necessary for such men as Ogden, Arnold and Harding, who were advanced to the rank of lieutenants in the Reserve Corps while on active duty as mechanics in the World Flight to revert to their former status now that their work is done, a general wave of protest was waged, the press voicing the sentiments of every true American. Regulations, or no regulations, these boys were being meted out an injustice so gross and unreasonable that public feeling simply boiled over in scathing protest. The President realizing that something should be done requested that adequate provision be instituted by Congress to take care of proper promotion and reward for soldiers and officers who perform signal services.

A movement was recently introduced whereby the World Flight pilots, Lieutenants Smith, Nelson and Wade should be specially promoted to the rank of majors and in addition each receive a cash reward and the Congressional Medal of Honor. The mechanics, to be promoted to the rank of first lieutenants (active) in the Air Service, and with cash rewards and Congressional Medals in addition, for their valorous service.

It is hoped that a measure of this kind will be made to cover the general fault in the Army regulation that will extend to all deserving ones in all branches of the Army and Navy.

As for the Air Service, it might be well to adopt the system of England by creating a separate Air Ministry, which takes equal rank with the Army and Navy. The seniority promotions could then be made in consideration of Air Service personnel alone.

With this system in vogue new Air Service recruits of a satisfactory type will be easier to secure and our first line of defense be built up to something worth while.

Low Speed Control Secret to Safe Flying

CONTROL at low speed is an item of greatest importance, both for commercial and military types of ships. Take-offs and landings are both difficult for the green flyer and full of possible mishaps for the seasoned pilot so long as the present comparatively high rate of speed is required to command control. Very little attention has been given to this subject of lower landing and take-off speed in this country, most all development being based upon the high power weight ratio.

A study along this line is suggested toward employing the use of flaps and slots to reduce landing speeds but this will involve the question of practical limitations due to the necessary increase in weight and change of structure which are to be considered with the general good promise of such devices. However, the present trend of development in airplane design and construction being toward safety and reliability the problem of increasing effective aileron and rudder control at low speeds is of paramount importance. In new designs a reserve of power should be provided by furnishing perfect control with the engine operated at a fraction of its maximum power output. This will increase the life and reliability of the engine, the vital part of the airplane. It will, in fact, mean, "safe flying."

The McCook Field Moving Estimate

Since considerable controversy has arisen as to the exact provision outlined by the Chief of Air Service in his report to Congress toward the proposed moving of McCook Field to the new site provided by citizens of Dayton, near Wilbur Wright Field, we quote the paragraph relating to this project which is furnished *Slipstream* by Major Ira A. Rader, Chief of the Information Division, Army Air Service, Washington, D. C.

> "x x x x—not exceeding $500,000 shall be available immediately toward the transfer of the testing and experimental plant of the Air Service now located at McCook Field, Dayton, Ohio, and the reestablishment thereof on a permanent site in the same vicinity, including the preparation of grounds, construction of buildings, installation of roadways and utilities, and all other expenses of whatever character connected with this project, provided that such a site, satisfactory to the Secretary of War and on terms approved by him, is provided for this purpose without cost to the Government: provided further, That the limitations contained in sections 1136 and 3734 of the Revised Statutes shall not apply to the work connected with this project: And provided further, That no part of said sum of $500,000 shall be expended for buildings or improvements on land not owned by the United States."

No further details on this subject will be available for publication until after the hearings of Congress on this matter have been published.

The Light Plane

By Ivan H. Driggs

Designer of The DJ-1, Winner of First American Light Plane Competition

Ivan H. Driggs, author of these articles on "The Light Plane" first became identified in aeronautical circles in 1914, with the Burgess Company, of Marblehead, Massachusetts. While with this firm he designed and constructed an exhibition ship in 1915.

He came to Dayton during the World War, taking up a position as engineer with the Dayton Wright concern. Later he transferred to McCook Field where he occupied an important position in the perfection of the Nelson Gun Synchronizer. He again made a change to the Dayton Wright Plant during the period this concern turned out the Gordon-Bennett Cup defender. He held there the position of Chief Assistant Engineer under Colonel Clark. He now is Chief Engineer for the Johnson Airplane & Supply Company of Dayton, one of the few expanding commercial organizations of America.

Mr. Driggs came more recently into prominence as designer of the DJ-1 winner of the Dayton News Trophy for Light Airplanes at the International Air Races of 1924. This little ship built at the Johnson Airplane & Supply Co. shops has given great promise and is generally conceded to be first choice among American designs of the light plane category.

Mr. Driggs will contribute a series of articles on Light Planes exclusively to *The Slipstream Monthly* which will no doubt be received with much interest by all aviation people. Extra copies of each current issue containing installments of these articles can be had by addressing an inquiry to Slipstream Publishing Company, 401 Beckel Bldg., Dayton, Ohio.

IN every country interested in aeronautical development there is no question that is attracting more attention today than that of the small light airplane. It seems to be of great interest to nearly everyone, whether connected directly with aviation or not. Some writers have very great hopes. Others reserve their opinions, while some view the light plane as an interesting but impractical toy. Whether or not the enthusiasts are correct it is the belief of a great many that these little ships, if properly developed can do nothing but good in furthering the use and science of aviation.

Such men as Mr. Orville Wright, Brig. General Wm. Mitchell, and Mr. C. F. Kettering have publicly stated that in their opinion the light planes were the most interesting and important aeronautical development shown during the recent Air Races held at Dayton.

The little ships also seem to have captivated the mind of the general public. The press has broadcasted articles describing the "Aerial Flivers," and suggesting the wonderful experience in store for all in the development of a cheap little airplane using but a gallon of fuel to fly forty miles. However these popular conceptions may work out, the feeling seems to pervade the aeronautical profession that the light plane may be the entering wedge, as it were, to commercial aviation.

Due to their small size and relatively low horsepower light planes can be produced, even in small quantities, at a cost comparable to that of some of the smaller motor cars. The uses to which these ships can be put are naturally somewhat limited. Those limits however are only those imposed by the small size and lack of overloading capacity. As far as general control ability, and performance under design load is concerned a light single seater can be constructed with a 22 horsepower motor that will equal if not surpass the performance of several airplanes used commercially today. The same degree of comfort and safety in bad air may also be accomplished. The records of British and American races seem to show that forced landings with this type are much less dangerous either to man or machine than with the larger and heavier ships. Very great maneuverability and sturdiness of construction may somewhat explain this interesting fact. In "*The Aeroplane*" of November 19, 1924, the views of an experienced pilot are given, in which he states that he would rather fly cross country in a light plane than in a faster, higher powered ship, because he has no fear of flying low. Traveling by plane becomes very monotonous if done at 4000 to 6000 feet. Low flying on the other hand is very interesting when the traveler may watch everything going on around him. This man feels that low flying with a light plane is perfectly safe due to its extreme maneuverability and ability to be "put down" in small areas of nearly any kind of ground. This thought is extremely interesting and is probably true except over mountainous country. However the above idea may work out, undoubtedly the light plane will find great usefulness for sport and for cheap rapid transportation over sections otherwise poorly accommodated. There is also the possibility of their use for training. A great amount of money might be diverted to the construction

of combat airplanes if such were found feasible by the Government. The British are already trying out this idea. It would seem that the United States should also experiment with light planes in some part of our training program. Possibly the Air Service Reserve officers might find them very satisfactory for practice during their yearly return for service. We, in the United States, may also follow the lead of the British in the establishment of Light Plane clubs among the ex-service pilots and red-blooded young men of the country. Light airplanes are so recent a development in this country, however that it is very difficult to predict just what the year 1925 may have in store. The experience gained during 1924 may be the foundation for the development during 1925 of types that will meet the needs for training and practice flying as well as for sport.

BEFORE proceeding with a technical discussion of the principles of light plane design it will be well to review and to analyze the work that has been done in developing this type both abroad and in this country. It is unquestionably true that the light plane idea is an outgrowth of gliding or soaring experiments in Germany during the last few years. After the war German aircraft activities were greatly curtailed by the conditions of the Peace Treaty. Desiring to keep up interest in aviation and to provide practice for their trained pilots the Germans offered substantial prizes for soaring flights under various specifications. After a period spent in gaining the experience necessary for the flying of these crafts; flights were made that astonished the world as a whole. It is a very significant fact that in nearly every case the most successful gliders were designed by men of some technical experience and who were thoroughly familiar with the modern theories of hydrodynamics as applied to aeronautics by Doctors Prandtl, Betz, Munk and others of Göttingen University Although the majority of these machines were built by trade school students under the supervision of their professors, the clear understanding of the above aerodynamical principles was plainly in evidence. The application of Doctor Prandtl's theorems enabled the glider constructor to design directly for the required performance. In other words they had been supplied with a formula by which they might solve directly for the size and shape of their machines knowing the results to be attained. Mr. Geo. H. Madelung has given an illustration of such procedure by describing the design of the Hannover Sailplane in the *S. A. E. Journal* of January, 1923. It is therefore very logical that Doctor Prandtl's theories shall be elaborated upon to a considerable extent further along in these articles.

Naturally after the publication of German records the French and English were desirous of trying their hands. Consequently the year 1922 saw some very fine flights in those countries. A group of students from the Massachusetts Institute of Technology constructed a glider for entry in one of the French competitions. This was probably the first serious American attempt at soaring since the Wright's experiments at Kitty Hawk. The greatest result of these trials was not that fine records were obtained but that they gave birth to the light plane idea.

The Europeans thought that if they could make such wonderful flights relying solely upon the wind for the power of sustentation, by installing a small auxiliary motor they might solve the problem of cheap and practical aviation. Consequently at the Lympne competition in England during the fall of 1923, and at various French trials somewhat earlier we have the advent of the so-called light plane. Viewed in the light of our knowledge a few years ago the 1923 single seater light plane was a revelation. Although nearly every meet was marred by incessant motor trouble the results obtained exceeded the wildest expectations. The French very quickly developed small motors for their craft but the English were forced to rely upon standard motorcycle engines, which proved hardly suitable for full power airplane service. The displacement of the motors in the Lympne competition was limited to 750 c. c. (about 45 cubic inches). Possibly the trouble experienced by the British may have been due to the fact that they were trying to take too much power out of the displacement allowed. It does not appear that the size of a motor is a particularly good indication of its suitability for an airplane. If the power output of the engine could have been limited in some way, to say 16 h. p., the designers might have had considerable more latitude in their choice of power plant. A slower, larger displacement motor would have worked a natural handicap by increasing the weight but would probably have kept the machines in the air for longer periods. Whatever the outcome of the motor problem may be the use by the English of the small displacement engine has proved one worth while fact regarding the light airplane. Forced landings may be made much more safely with these machines than with the heavier, more sluggish and faster types.

One of the most interesting features of the International Air Races held in Dayton, Ohio, this year, was the display of "home-made" airplanes assembled in a specially designated enclosure popularly termed by aviation folk as "Hell's Half Acre." The illustrations in the above group were taken at the recent Dayton Air Meet. (1) Orville Snyder, standing by his light plane; (2) The Fasig-Turner light plane; (3) E. B. Heath, with the Heath sport light plane; (4) Pilot Walter Lees, seated in the Hartzell FC-2, winner of N. C. R. trophy; (5) Pilots who competed in the Dayton Daily News Light Airplane Trophy Race, reading from left to right are: Jimmie Johnson, E. Dormoy, G. Van Dack, E. M. Laird, and H. C. Mummert; (6) Side view, Dormoy's "Flying Bathtub" light plane; (7) The Mummert light plane, H. C. Mummert, designer in cockpit; (8) Front view, the Heath sport model light plane.

THE next step was naturally to the two-seater which made its debut at Lympne in the fall of 1924. Again motor trouble was much in evidence although motorcycle engines had been replaced by motors designed especially for the service. The general performances were on the whole very satisfactory, when the airplanes were permitted to fly by their balky motors. The results were such that the conclusion may be drawn that from 30 to 35 h. p. is sufficient to make a two-seater light plane equal the performance of some of the standard training planes using from 2 to 3 times that power. These 1924 competitions further demonstrated the safety of these ships in forced landings. Out of numerous cases of motor failure away from the airdrome by nearly every machine, but one suffered any structural damage. The two-seater competitions also further substantiate the thought that a larger displacement engine of the same power would have kept the planes in the air for much longer periods and have produced a more practical airplane.

During 1922 and 1923 the United States remained inactive in the development of gliders and light planes, except for the one case already noted. However the N. A. A. came to life in 1924 with light plane races to be held in conjunction with the International Air Races at Dayton. We as Americans cannot point with a great deal of pride to the results obtained. Although the conditions under which these races were run were in no way comparable to the Lympne competitions, the number of the ships was very disappointing as well as the general quality. Of nine machines entered, but six were on the line for the start. Only one of these six finished the three races on the program, one other finished two races, and one finished but one race. The remaining three either never left the ground or were forced out shortly after the start. The direct drive Henderson four-cylinder motorcycle engine gave very satisfactory service in Dormoy's *Flying Bath Tub* and Johnson's DJ-1 machines. Although Dormoy was forced down on his second race by very bumpy air his motor was running perfectly. Johnson made three forced landings in pastures, plowed fields, etc., due to imperfect full flow, but his Henderson functioned smoothly in every race. It is a significant fact in comparison with the English single-seater trials that neither of these two motors had any adjustment whatever during the period of the races. Those designers employing the geared twin cylinder Vee motors, however were not so fortunate. The vibration in some cases was so excessive that the very light structures were repeatedly broken. Chain drives also contributed their share of trouble.

Certain conclusions may be drawn from the results of the European and American races.

FIRST. For a single seater from 18 to 25 horsepower and for a two seater 35 to 40 should be sufficient for practical purposes.

SECOND. The displacement rating of the automobile races should not apply to aircraft. Power alone should determine the classifications.

THIRD. Gearing in any form unless highly developed is a definite source of trouble.

FOURTH. The smoothness of four cylinder motors is highly desirable.

FIFTH. Light planes as a class possess qualities that make them very safe in forced landings, and that their sturdiness on poor ground is superior to the larger machines.

SIXTH. Performance characteristics and maneuverability equal to if not better than some standard training types have already been obtained.

A GREAT deal of general discussion has been offered on the subject but as yet no attempt has been made to define the term "Light Plane." That is a question that is receiving a great deal of attention both abroad and in this country today. Is a light plane a motored glider? Is it an under powered airplane? In the light of what has been accomplished it is neither. Of course, as pointed out previously the original idea was the outgrowth of glider or soaring machine development. In fact one of the British single seaters the "Wren" could very truly be called a "motor-glider," as in 1922 the same machine without engine had been used in the soaring competitions. However, the problems of gliding and flying from place to place are widely separated. A glider receives its sustentation from a wind which has a strong upward component. Such a machine is designed so that its sinking speed will be a minimum and equal to or less than the rising speed of the wind in which it is flying. This necessitates a very high ratio of lift to drag at a very **low speed.** The aim in soaring is to stay off the ground as long as possible. Powered flight on the other hand has for its purpose the accomplishment of useful work, namely, the transportation of a required pay load through the maximum distance, in the shortest possible time and at the least cost. This is a problem of range of flight rather than of duration, as in the case of the glider. Winds cannot be depended upon for assistance as it may be necessary to fly in a direction from which no help but rather hindrance can be expected from the air currents. An airplane will be the most efficient in meeting the demands of commercial work when it is least affected by the

wind. This means that the cruising speed should be high in order that the percentage reduction in velocity over the ground experienced in average air conditions may be low. The practical airplane should have a margin over its most efficient cruising speed at least equal to the average velocity of the winds liable to be encountered. The light plane therefore must have a very high ratio of lift to drag at **high speed** in order that flight may be accomplished with low power.

Thus the requirements of a glider and of a light plane are similar in one respect only, the necessity for a very high ratio of lift to drag. The motored glider will have a phenomenal duration but will not be a practical airplane.

LIGHT planes are not underpowered in the true sense of that term. The number of pounds carried per horsepower is much greater than designers have previously deemed advisable in the construction of military types. This high power loading is the *raison d'etre* of the light plane. For commercial work the greatest possible load must be carried by the minimum power. Everything else being equal, that airplane which has the highest power loading will be the cheapest both in first cost and in operation. **An airplane is underpowered only when it is unable to properly function in the service for which it was intended.**

If that service be to transport a pilot and baggage 200 miles at a speed of 75 miles per hour and passing over a mountain range 12,000 feet high on the way, that airplane which fails in the accomplishment of the above is underpowered whether it carries 15 or 30 pounds per horsepower.

The advocates of the light plane believe that there are two ways of increasing airplane performance, namely, by either increasing the motor power available or by decreasing the power required for flight; and that the latter method is by far the most logical and scientific.

An increase of power necessitates an increased fuel load, and therefore a greater total weight. Consequently the cost of the airplane both as to original outlay and as to maintenance increases. Everyone has heard the statement "Give us power enough and we can fly the kitchen table." The light plane is diametrically opposite to a powered "kitchen table." It may be defined as a scientific attempt to obtain the greatest possible useful work from the least power. Inci-

Table I

Machine	Type	Motor	Weight Light	Weight Loaded	Wing Loading	Power Loading	High Speed	Rate of Climb	Ceiling	Miles Gallon
Avro 558	B-S	500 c. c.	294	480	2.89	26.7			13,850	
Avro 560	M-S	698 c. c.	285	471	3.41	23.5				87.5
A. N. E. C.	M-S	698 c. c.	289	465	3.21	23.2	74		14,400	
Wren	M-S	398 c. c.	232	408						82.5
Gull	M-S	698 c. c.	402	500	3.52		55.25			
Gannet	B-S	750 c. c.	283	460	4.47					
D. H. 53	M-S	750 c. c.	310	490	4.08		59.3			59.3
Viget	B-S	750 c. c.	395	575	2.88	26	58.1			
Poncelet	M-S	750 c. c.					58			
Peyret	M-S	750 c. c.							9,400	
Raynham	M-S	750 c. c.								65.7
Pixie	M-S	500 c. c.					76.1			
Hurricane	M-S	600 c. c.		520	6.4		58.5			
H. P. 23	M-S	500 c. c.		480	2.85					
H. P. 25	M-S			430	2.75					
H. P. 26	M-S	698 c. c.		500	8.10					
Dormoy	M-S	80 cu. in.								
Mummert	M-S	74 cu. in.								
Driggs	M-S	80 cu. in.	326	511	7.3	22.7				
Snyder	B-S									
Turner	B-S	74 cu. in.								
Heath	B-S									
Brownie I.	M-T	1096 c. c.	500	870	4.3	29	70			
Brownie II.	M-T	1096 c. c.	500	870	4.5	29	70			
Cranwell	B-T	1096 c. c.	510	890	3.75	29.6				
Wee Bee	M-T	1096 c. c.	462	837	4.47	25.6	86			
Wood Pigeon	B-T	1096 c. c.	439	779	5.03	26	72			
Widgeon	M-T	1096 c. c.	450	790	5.5	26	72			
A. N. E. C.	M-T	1100 c. c.	415	730	3.94	24.3	85			
Short	M-T	1096 c. c.	483	850	5.05	28.3	73			
Sparrow	B-T	1100 c. c.	478	860	3.26	28.6				
Avis	B-T	1096	450	810	3.20	27.0	75			
Blue Bird	B-T	1100 c. c.	495	875	3.60	29.2	74			
Vagabond	B-T	1100 c. c.	527	887	3.96	29.6	74			
Pixie III.	M-T	1096 c. c.								
Pixie III. a	B-T	1096 c. c.								

M—Monoplane
S—Single Seater

B—Biplane
T—Two Seater

dentally this results in an airplane extremely cheap in all respects.

Brief mention has been made of the different stages of light plane development, and attention has been directed to the dependence of the designers to a great extent upon the work of Doctor Prandtl. The motor glider idea as well as the criticism of light planes being underpowered have been discussed and shown to be the wrong conception.

The January issue *Slipstream Monthly* will proceed with a mathematical discussion of Doctor Prandtl's theory in conjunction with an outline of rather elementary aerodynamics. Table I is appended for reference showing the majority of existing successful light planes. (Drawings of these designs may be had upon request to editor of Slipstream Monthly.)

(*To be continued in January Slipstream*)

Editor's Note—

Due to the prohibitive space which would be used in giving drawings, specifications, and technical data concerning the various types of American and Foreign Light Planes we are unable to publish same in this issue. However, a complete file of blue print drawings and data on the various designs of any promise are available at the headquarters of the Slipstream Publishing Company, which will be furnished free of cost for the mere asking.

The Driggs-Johnson Light Plane

This light plane is one of the first planes of its type to be constructed in this country. It was built primarily for entry in the Dayton Daily News and Dayton Engineers' Club races at Dayton, October 3 and 4. The Johnson Airplane and Supply Company being in close touch with commercial aviation in general also believes that this little ship will fill a very definite want for an airplane with low first cost and low upkeep.

The designer of the DJ-1, Mr. Ivan H. Driggs, is an engineer of wide experience, having been formerly assistant chief engineer with the Dayton-Wright Company under Col. V. E. Clark. Consequently, this airplane cannot be considered an amateurish attempt. All construction work, except motor, was carried on in the shops of the Johnson Airplane and Supply Company at Dayton.

Description

Fuselage: The fuselage structure is of welded steel tubing braced with Roebling wire. Aft the cockpit the lines fair into a triangle with apex at top longeron. The cockpit is completely cowled in with celluloid to a perfect streamline, fairing into the triangle of the fuselage. The rear view gives a very clear idea of this construction.

Power Plant: The engine used is a four-cylinder eighty cubic inch aircooled motorcycle motor of standard make. Thrust bearings and propeller hub extension were built onto the motor in place of the regular flywheel and flywheel housing. Cooling is accomplished by means of a scoop at the front under the motor which forces air under the oil pan and then up the left side of the engine onto the exhaust and intake valve chests. The air is then drawn across the engine from the left to right by suction louvers on the right hand side of the cowling. An air scoop is also provided at the front of cylinder number one to aid in the circulation. Likewise, a small louver throws air to the top of each cylinder. The photographs give some idea of cowling arrangement. The fuel tank is mounted in the leading edge of the wing directly over the engine providing an excellent feed by gravity to the carburetor.

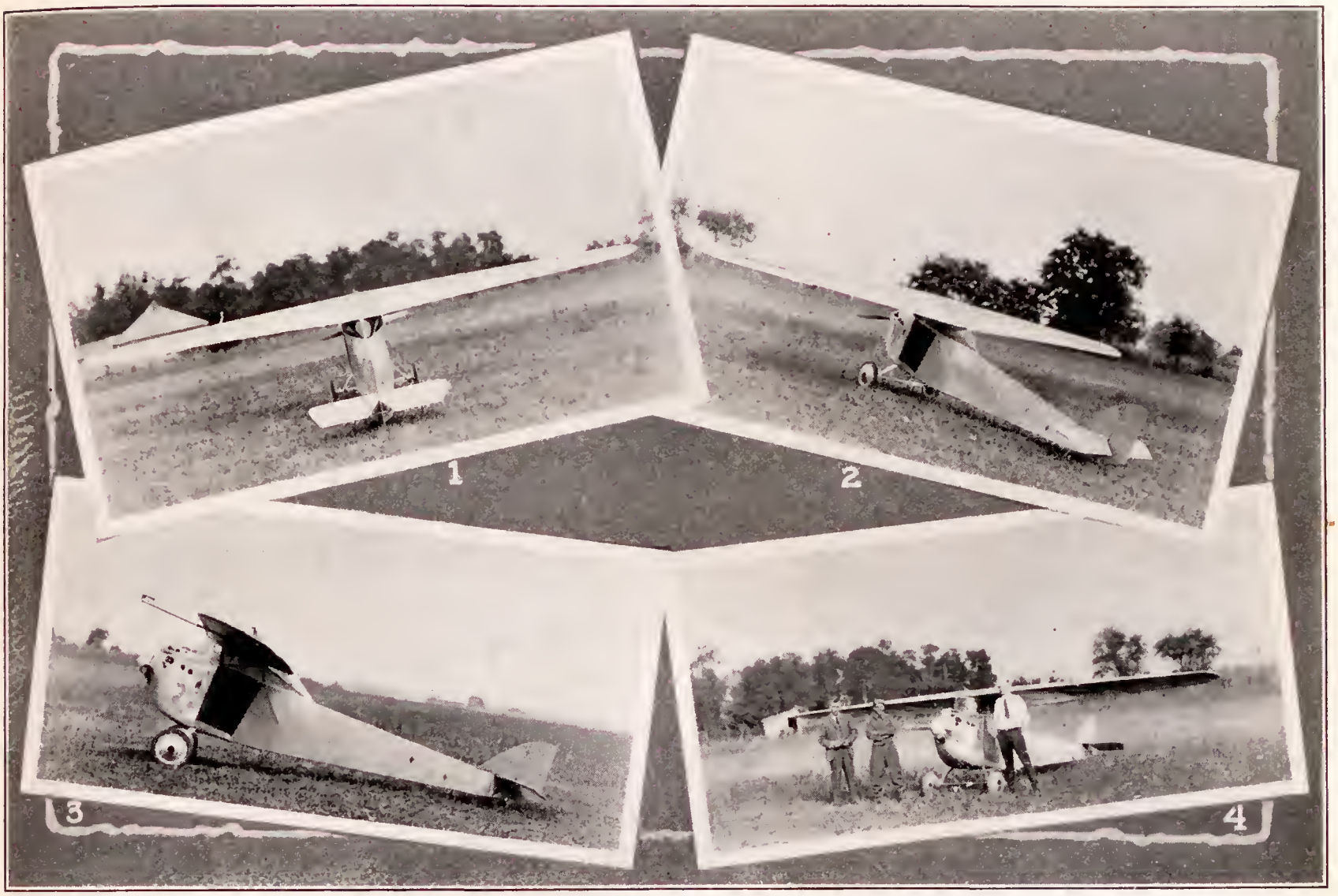
Wing: The airfoil used is U. S. A. 45. The wing is entirely internally braced, with 1/16 birch plywood covering for torsional stiffness. The spars are laminated spruce and unrouted. The spar width is graded outward from the root as the stresses decrease by leaving off successive laminations. The ribs use 1/16 Spanish cedar three ply as webs and 3/16 x 3/16 spruce battens nailed and glued to each side. Aft the rear spar the ribs are covered with airplane linen, doped and varnished. The ailerons are constructed of welded steel tubing fabric covered.

Empennage: The tail surfaces are of welded steel tubing, fabric covered. They are completely braced with Roebling wire.

Landing Gear: 450 x 60 m/m Palmer wheels are fitted. The construction is evident from the photographs. The single strut is of streamline steel tubing, the bracing Roebling wire.

Flying Qualities: No performance test has been run to date so that accurate figures can be given. The high speed is somewhat in excess of eigthy-five miles per hour determined approximately by racing a Laird Swallow. The control is normal in every respect and although very light the feel is perfectly satisfactory. The airplane flies very smoothly and gracefully and does not give the pilot any feeling of insecurity such as so often is present in small airplanes.

During the race on October 4, because of poor fuel, three forced landings were made in very rough and difficult country. Mr. J. M. Johnson was forced to land the first time in a newly plowed field, which he negotiated without mishap by side slipping to within a few feet of the ground before straightening out. At one time he was forced to take off a meadow covered with weeds up to the center of the propeller. After getting off it was necessary for him to bank steeply around a number of trees before getting clear. In a wind the DJ-1 is exceptionally easy and comfortable to fly. In bumps it is much better than a JN-4 and absolutely no force is needed on the stick. A slight motion of the fingers or wrist is sufficient for control in the most severe weather.



Four Views of the D-J-1 Light Plane—Ivan Driggs, designer, is shown at right in View No. 4.

Wing area	70 sq. ft. Total	
Aileron area	7 sq. ft.	
Wing span	27 feet	
Wing chord at root	44 inches	
Wing chord at tip	22 inches	
Mean chord	33 inches	
Distance from C. G. to tail post	12 feet	
Distance from C. G. to tail post Times mean chord	4.37	
Area of rudder	2.4 sq. ft.	
Area of fin	2.0 sq. ft.	
Area of elevators	3.3 sq. ft.	
Aera of stabilizer	3.9 sq. ft. 11.7 total	
Engine 4 cylinder air cooled 28 H.P. at 3400 r.p.m. 2 11/16 bore x 3½ stroke		
Propeller	4 ft.	

WEIGHT SCHEDULE:

Wing Group:

Plane exeluding of ailerons	75.4 lb.	lbs. sq. ft.	1.195
Ailerons	7.0 lb.	lbs. sq. ft.	1.00
Total wing group	82.4 lb.	lbs. sq. ft.	1.18

Empennage:

Elevator	2.6 lb.	lbs. sq. ft.	.79
Rudder	1.65 lb.	lbs. sq. ft.	.66
Stabilizer	3.3 lb.	lbs. sq. ft.	.85
Fin	1.4 lb.	lbs. sq. ft.	.7
Total empennage	8.95 lb.	lbs. sq. ft.	.765

Body Group:

Fuselage	32.5 lbs.	Cowling	17.9 lbs.
Total body group			50.4 lbs.

Landing Gear Group:

Chassis 7 lbs., wheels 18 lbs., tail skid 1.25 lbs.

Total ldg. group	26.25 lbs.
Total structure	168.00 lbs.

Power Plant:

Engine 127 lbs., Propeller 5 lbs., Ignition harness .75 lbs.
Gas tanks 3.8 lbs., Gas pipes 2.5 lbs., Oil pipes .25 lbs.
Engine controls .75 lbs., Exhaust manifolds 1.0 lbs.

Total power plant	141.05 lbs.

FURNISHINGS:

Floor 1.7 lbs., Surface controls 1.5 lbs., Instrument board .5 lbs.
Control wires 2.0 lbs., Seat 5.2 lbs., Cushions 2.0 lbs., Safety belt 1.2 lbs.

Total furnishings	16.8 lbs.
Total Weight Empty:	325.85

Equipment	Instruments	4.0	lbs.
Crew	Pilot	150.0	lbs.
Fuel	3¾ gal.	23	lbs.
Oil	1 gal.	8	lbs.
Gross Weight:		510.85	lbs.

New York University Students to Build Light Plane

The work in the Department of Aeronauties at New York University is not only providing technieal training in aeronautics for a limited number of students, but has aroused general interest in aviation among the general student body of this university, whose regular degree students number 6,000, and whóse total registration is some 17,000 this year; and to foster sueh interest in the eoming generation of university graduates is undoubtedly useful.

The students at the university have now decided to enter a light plane for the next eontest for this type. An Aero Club has been formed. A eommittee of this Aero Club is eolleeting the neeessary funds amongst the faeulty and student body for the purchase of an engine and materials. The plane is to be designed and built by the students themselves, among whom are found aeronautieal engineers in process of training, several experieneed airplane meehanies, and a few exeellent pilots. Professor Alexander Klemin is aeting as adviser to the student group, and all the shop facilities of the Department of Mechanieal Engineering are at the students' disposal.

Concerning the Observation Airplane Competition

The interesting group of ships shown on the opposite page represents one of the most important items in the program of military airplane development in the United States since the World War. News releases concerning these brand new types of the observation category, formerly designated as "Corps Observation" have not yet been made and we are therefore not in position to give definite specifications of the various designs until a later date.

These planes are entered in an Observation Airplane "contest" being conducted at McCook Field, Dayton, Ohio, and are now undergoing test at this post under a board of officers appointed by the Chief of Air Service to determine the best type of Observation Airplane built around the Liberty Engine. This board convened on November 20, and is now conducting the tests on the various planes entered.

Upon completion of the tests the recommendations of the board will be forwarded to the Chief of Air Service for final action.

Contracts for at least 100 airplanes of the type selected will then be entered into.

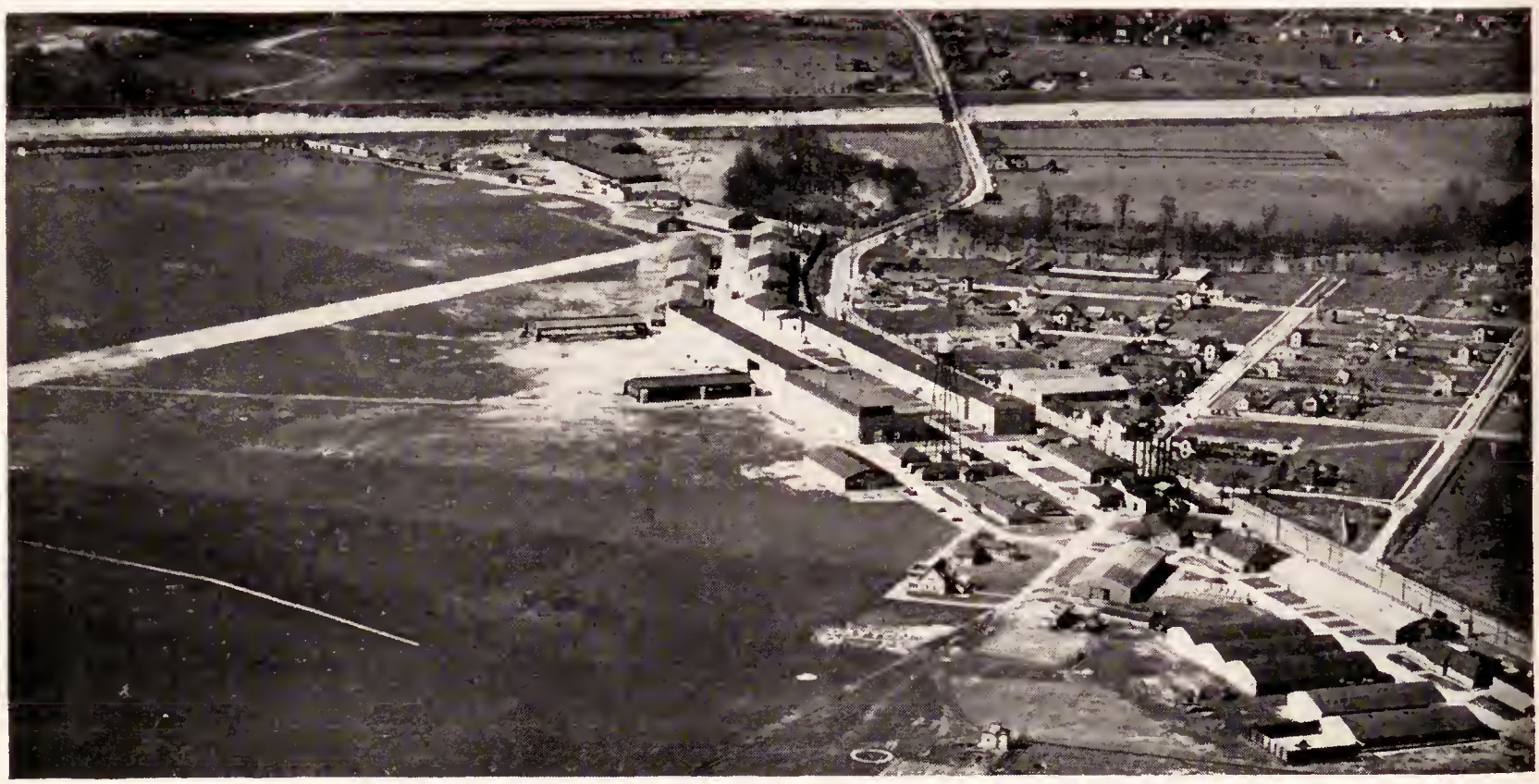
These airplanes have been constructed to comply with present Air Service requirements as to load, speed, climb, ceiling, etc., and it is hoped that the design chosen as the best of this lot will afford a valuable asset to the Air Service in replacing the present obsolescent DeHaviland type of the World War period.

Simultaneous with the test of these airplanes which are all built around the Liberty Engine, another competitive test is being held under the direction of the same board of officers, for observation planes built around the Wright T-3 and Packard 1A-1500 engines. Three planes are entered in this competition:

Curtiss XO-1.....Packard Engine
Douglas XO-2 ....Packard Engine
Wright XO-3.....Wright T-3 Engine

The Douglas and Curtiss entries are the same as entered in the Liberty-Engined Observation competition with the exception of the motor change.

A quantity of the airplane decided by the board as the most desirable will be purchased as a result of the competition. These will be purchased in service test quantity only, in order to enable a thorough service test of either the Wright T-3 or the Packard 1A-1500 engine.



McCook Field Soon To Be Moved To New Quarters Near Dayton.

This group of very new designs, Observation Airplanes were obtained after a great deal of negotiation and correspondence with the various concerns directly interested. It gives us pleasure to present for the first time this interesting group of new aircraft. (1) The Curtiss XO-1 (Liberty Engine); (2) Cox-Klemin CO-1; (3) Engineering Division (Cox-Heinkel) TP-1; (4) Boeing X-CO-7B; (5) Engineering Division (Boulton-Kerber) XCO-5; (6) Douglas XO-2 (Liberty Engine); (7) Engineering Division (Roche) XCO-6 (Inverted Liberty Engine); (8) Fokker CO-4; (9) Atlantic Fokker), AO-1; (10) Atlantic-Loening XCO-8.

A typical scene at Grisard Field, Cincinnati, Ohio, most any good flying day, during the summer and autumn months. An Air Mail extension line leading from Cleveland and using Grisard Field as a southern Terminal is under consideration.

Fairfield Depot to Be Moved

Wilbur Wright Field (Fairfield Air Intermediate Depot) well-known spot to thousands of war-time flyers bids fair within a short time to take on new activity in the proposed move of the Supply Depot to the Middletown, Pennsylvania, Air Depot Post, and the subsequent occupation of these vacated quarters by the Engineering Equipment of McCook Field.

The Middletown Air Intermediate Depot, although having adequate storage facilities has not been fully utilized and it is thought that by combining these two posts of identical character an item of economy will be brought about.

The Wilbur Wright Field location was selected soon after the United States entered the World War as a training ground for Air Service troops. During the period from August, 1917, to the end of the war, fifteen squadrons which includes 5,000 men, received instructions in flying and aerial gunnery at the station. In 1920, after a post-war lull the field activities began to pick up again. The Aviation repair depot at Indianapolis, was abandoned and the equipment moved to Wilbur Wright Field. Later the Government made the post the central supply and repair depot, and the headquarters of the field service section, now known as the cost compilation and property maintenance branches.

Besides these three important divisions, there is located at this post the 88th Observation Squadron, and the 7th Photographic Section.

It is planned to move as much of the civilian personnel as can be practically accomplished when the change is made to the Middletown Post.

Lack of available money for erecting permanent buildings on the new McCook Field site makes it necessary for the vacated office buildings and hangars of the Supply Depot being utilized for Engineering Division purposes until differences and difficulties in Washington are ironed out, and more money appropriated for permanent buildings.

The Aircraft Industry

Its Relation to National Defense

THE present American aircraft industry is but a shadow of that which existed at the time of the Armistice. With the great stimulus in aircraft development and performance during the war, the aircraft manufacturers were hopeful that civil aviation would rapidly come into being with a resulting great demand for their product. Civil aviation has not developed as it was hoped it would and this makes the present situation more difficult.

These aircraft manufacturers have had to rely for orders upon Government agencies and the limited amount of governmental purchases has forced a number of manufacturers to go out of the aircraft business. It is a matter of grave Government concern lest the productive capacity of the industry may become so far diminished that there may not remain a satisfactory nucleus. By a "satisfactory nucleus" is meant a number of aircraft manufacturers, distributed over the country, operating on a sound financial basis, and capable of rapid expansion to meet the Government's needs in an emergency.

After the very costly lessons of the war, it would be folly to say that the Government is not concerned with the state of the aircraft industry. It is concerned that there should be in existence, and in a healthy condition, at least an adequate nucleus of an industry. An aircraft industry is absolutely essential to national defense. One lesson of the war that will not be forgotten is that it takes a great deal of money to develop hastily an aircraft industry from almost nothing. The American people can ill afford to pay such a price a second time. To maintain a nucleus of an industry it has proposed either that the Government substantially increase the volume of its orders for aircraft, or devise a policy for the apportionment of orders at fair negotiated prices, without regard to competition.

It remains to be seen what the Congressional Select Committee decides and if they figure that increased appropriations are needed to remedy the trouble. To increase appropriations for the Army and Navy Air services because they need more aircraft is one thing, but to increase appropriations primarily to maintain an aircraft industry is something else. Furthermore, the maintenance of an industry in a healthy condition does not involve the maintenance of any manufacturer who has failed to liquidate or reduce his plant and overhead expenses to an appropriate peace-time basis.

The National Advisory Committee for Aeronautics has mapped out what it feels is a solution for the existing bad situation in the industry. In an effort to help the situation, the Committee suggests the following steps on the part of the industry and of the government:

Steps to be Taken by the Industry:

1st. Every manufacturer intending to remain in the aircraft business and who has not readjusted his war-time plant and overhead expenses to a peace-time basis should do so without further delay.

2nd. The firms comprising the aircraft industry should specialize in the production of various types of aircraft with a view to the more continuous development of types by the same plants and the gradual recognition of proprietary rights in new designs.

Steps to be Taken by the Government:

1st. The Army, Navy, and Postal Air Services should agree upon a balanced program setting forth from time to time the probable requirements of the Government for each type of aircraft for at least one year in advance, and should announce the same to the industry for information and guidance.

2nd. Orders for the different types should be placed with the different manufacturers at such intervals as to insure continuity of production and the gradual development of special facilities and skill by each manufacturer in the production of a given type of aircraft.

The Committee does not attempt to say that the method proposed is the ideal solution but it submits that if followed it would produce the following beneficial results:

(a) It would insure the continuous development of types by the same firms which is the most rational method of improving the quality and performance of aircraft to meet special needs.

(b) It would reduce the cost of aircraft.

(c) It would provide all manufacturers with an adequate market to enable them to continue in the airplane business without the periodical menace of dissolution or bankruptcy heretofore caused by long gaps between orders.

The governments of England, France, and Italy maintain restricted lists of approved manufacturers divided into groups for the building of various types of aircraft. Orders for aircraft are apportioned among the manufacturers in such a way as to provide, as far as possible continuous production in all plants, at prices that are the result of negotiation, based upon known

or estimated cost data. If such a system could be followed in this country, it would be advantageous in stabilizing the American aircraft industry.

Commercial Aviation and its Relations to the Government

The stimulus of war forced the development of aviation for military purposes, and while the progress thus made was beneficial to all aviation, nevertheless there has been but little application of aviation to commercial purposes. In England, France, Italy, Germany, Holland, Belgium, Poland, and other European countries, there are air lines for the transportation of passengers and goods on regular schedules across international boundaries and intervening seas. It is quite a customary thing for tourists and business men to travel by air, for example, between London and Paris. There is a great rivalry for business between French and English companies, all of which are subsidized by their governments.

There is at the present time in the United States no large regular air transportation business, although enterprising firms from time to time have undertaken to establish more or less regular routes between points deemed peculiarly attractive for the development of an air transportation business. The Air Mail Service operated by the Post Office Department has given the best and most practical demonstration of the reliability and adaptability of aircraft to the useful purposes of commerce. The present experiment by the Air Mail Service to determine the practicability of night flying, is the most important development in aviation today and should prove to be of substantial assistance in the development of commercial aviation in America.

The reason for the greater development of commercial aviation in European countries to date lies in the fact that they realize more keenly than we in America do, the vital necessity of aviation to national defense. They are either adjoining neighbors or within a few hours of each other by air, and unless military aviation in those countries is to bear the entire cost of the maintenance of aircraft industries and of aviation development generally, those countries must in sheer self-defense encourage commercial aviation. This they have done in every practicable way, principally by subsidizing common carriers by air, especially those engaged in international aerial transport.

In the United States direct subsidy appears to be out of the question because of our adherence to a traditional policy. In our country aviation must make its own way. Civil aviation has not progressed very far because it has not yet reached that stage of development that justifies its use generally from an economic point of view, unless an inordinate value is to be placed upon speed. Speed and maneuverability may be prime factors in military aircraft, especially in time of war, but for commercial purposes aircraft must be made safer, more controllable at low speeds incident to taking off and landing, and less expensive in initial cost as well as in maintenance and operation.

Commercial aviation will have to be regulated, just as are other means of transportation. The initial legislation in this respect should be very carefully prepared, so that, while affording that degree of regulation considered necessary in the public interest and that degree of practical assistance that would be helpful, it will nevertheless leave the new art of aviation ample freedom to develop normally without unnecessary or unwise restrictions and without attempting to set up by legislation an artificial basis for the maintenance of the activity to be regulated.

N. A. C. A. Report

Too Small a Field and too close to the City is the bugbear at McCook Field, Dayton, Ohio.

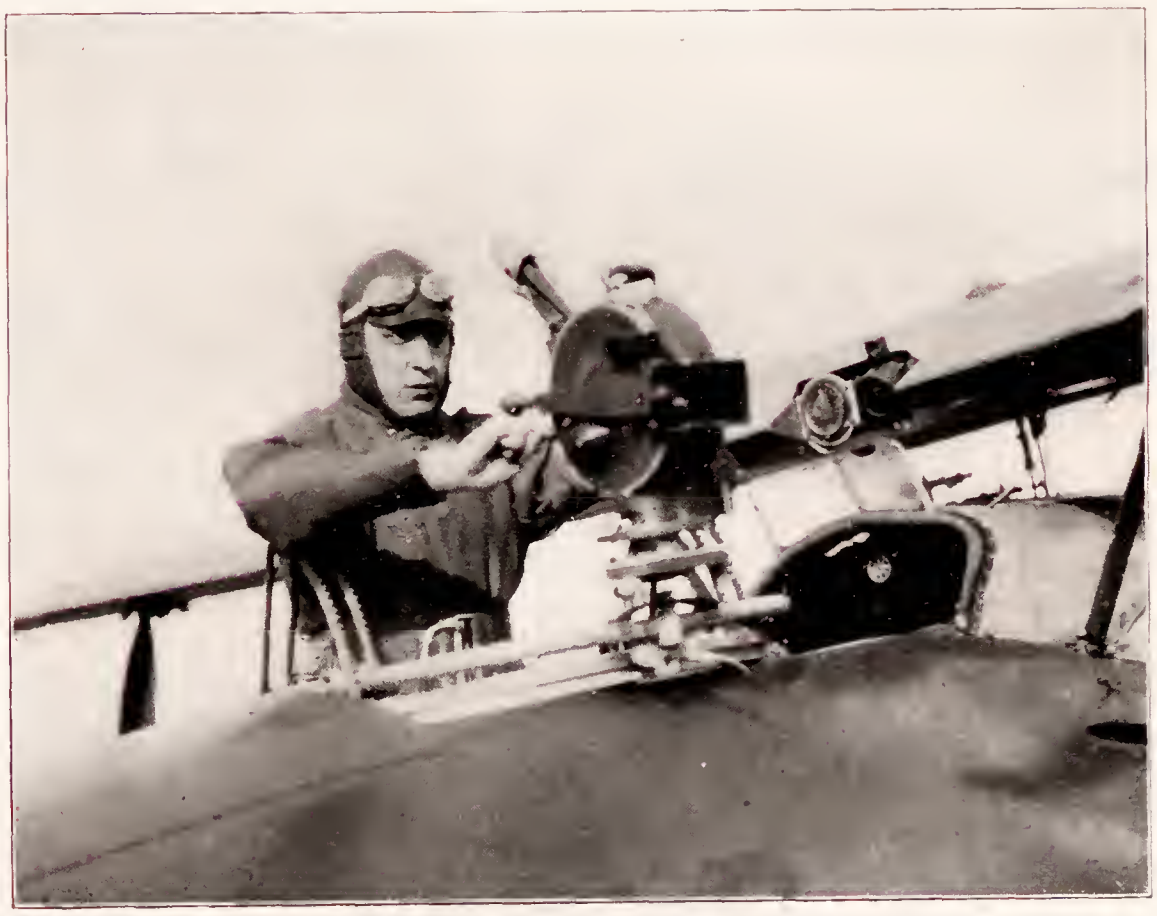
"Aerial Photography"

A Practical Application of The Airplane

By Gerard H. Matthes, Consulting Engineer, Fairchild Aerial Surveys, Inc., New York City

(Extracts from an address delivered under the auspices of the College of Engineering, New York University.)

THE remarkable development that aeronautics has witnessed in the short space of two decades has brought with it many new phases of modern life. Among these, map making by aerial photography is rapidly attaining prominence. This art has now reached a point where it becomes possible as the result of one day's flying and picture taking, followed by a month's work in the laboratory, to produce an accurate map that by the older methods of surveying could not have been made under half a year or more.



The "Movie" camera furnishes the more romantic touch to the exhibitions of aerial photography as we view this work from the screen but of more value to science is the survey work done by the still camera such as is shown on another page of the magazine. (Louis Hagemeyer, veteran Air Service photographer in cockpit.)

Aside from such research as has been carried on by the War Department, the main development work in this country has been done by private capital, such as the well known Fairchild Aerial Surveys, Inc., of New York, which for some years past has been engaged not only in manufacturing high grade cameras specially adapted to aerial work, but especially in the production of accurate maps for a variety of purposes, including those of the engineering profession, which as everyone knows, requires maps that must be reliable.

The next time you see an airplane hovering over your neighborhood, do not be misled in thinking that someone is making an aerial photographic map, for the aerial photographic engineer is a high-flyer in the true sense of the word. He prefers to operate from around 8000 to 15,000 feet above the ground, and it is not likely that you would spot him at work unless you were previously told just where to look for him. High altitudes are of advantage to him in more than one way. First, atmospheric conditions are usually steadier there than at low altitudes; second, there is safety in being high—in case of engine trouble there is better prospect of finding a nice spot to land on; third, errors in scale of the photographs due to slight changes in the altitude of the airplane, such as are unavoidable in flying, become less noticeable.

Some people think that aerial photographs are distorted near the edges. There is no noticeable distortion caused by the lens. Along the edges, however, hilltops, and high buildings appear displaced, due to perspective. This is not a serious matter to the aerial map maker, who can by simple processes determine the amount of such displacements and correct it.

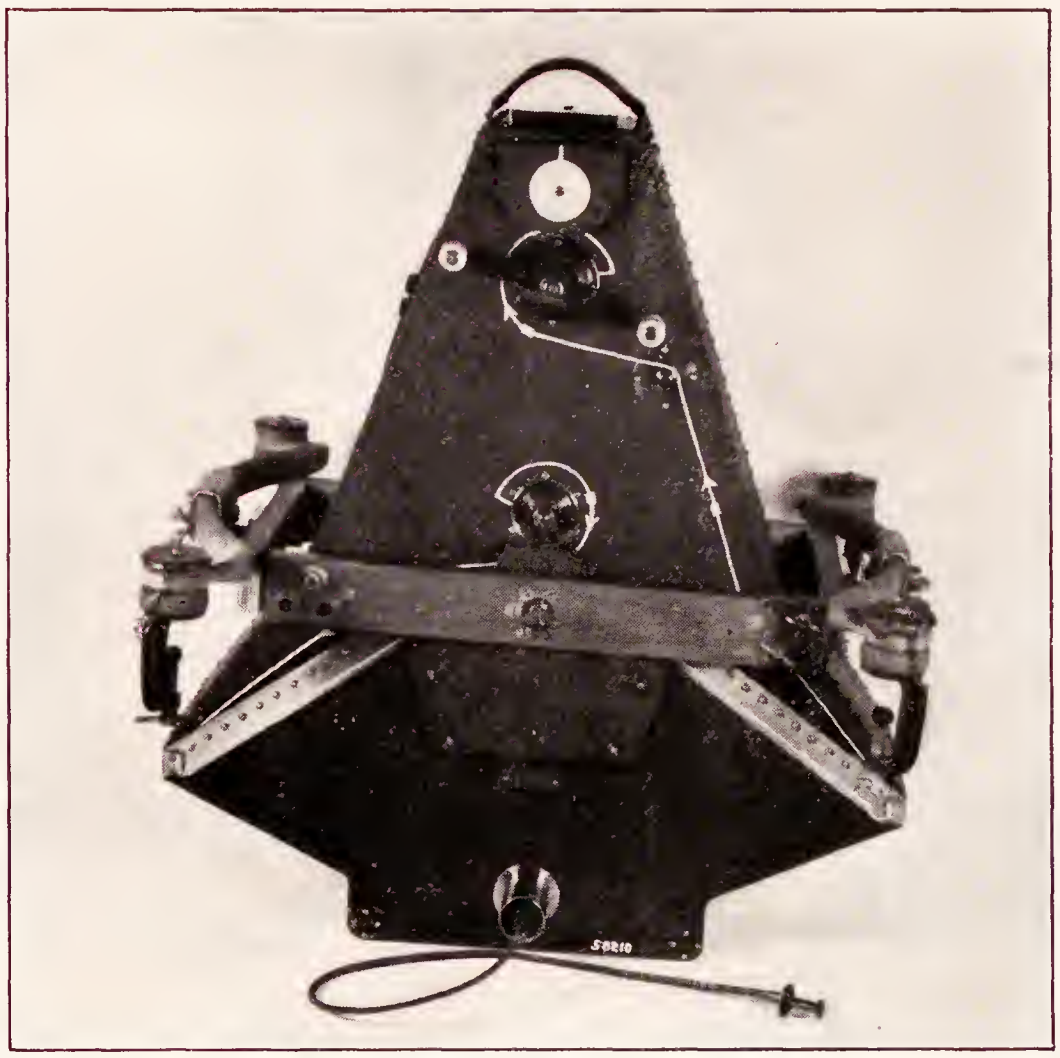
WITHIN the last two years tremendous progress has been made in this new field of endeavor, and the results that have been accomplished have aroused the interest and enthusiasm of engineers, public officials, and corporation

Some diversified practical uses of aerial photography are exemplified in the accompanying illustrations. To the right is shown a view of the Cypress jungle around Deep Lake, Collier County, Florida, a new district entirely surveyed by the aerial method.

To the right of this view is shown an aerial photo of a typical water supply stream many of which engineering projects are guided by aerial photos and mosaic maps.

Below is shown the graphic values of the aerial photograph in bringing out the features of real estate development. The progressive real estate firm has found a valuable asset in the aerial camera. This view taken of west Dayton, Ohio, solved a controversy in the selection of the new Roosevelt School site.

managers. It is now possible to make aerial maps as accurate, and often more so, than regular surveyors' maps. It should not be imagined that aerial photography is a cheap process. It cannot be cheap from the mere fact that airplanes are required in its production; and anyone familiar with airplane operation and maintenance will appreciate that fact. Furthermore, the cameras required are necessarily elaborate and costly. To photograph ordinary objects, such as houses, roads, trees and the like from an altitude of two to three miles above the ground calls for exceptionally large and powerful lenses, and highly sensitized photographic film. The film now in use comes in rolls 75 feet long and 9 inches wide sufficient to produce over 100 exposures, each 7 by 9 inches. These films are about ten to twelve times as sensitive as ordinary kodak films and cannot be developed except in absolute darkness.



A remarkable type of Tri-Lens Aerial camera developed by Major James Bagley at McCook Field, Dayton, Ohio. At an altitude of 16,000 feet it will photograph a strip of country over 10-miles square in proper proportions for survey calculations.

In spite of the cost attached to this work, it is nevertheless a fact that photographic maps are cheaper by far than maps produced by modern surveying methods. Moreover, the information made available by them is not subject to the omissions and errors that are so common in ordinary maps. The completeness of the features portrayed is such that no surveyor, however expert, could hope to embody in a map in any reasonable time or at any reasonable cost.

As regards the time required for making aerial surveys any comparison with ordinary surveying would be hardly fair. The rapidity with which an airplane crew can snapshot the ground over which they fly puts this kind of endeavor in a class entirely by itself. True, it is necessary sometimes to wait many days for a good clear day, but when such a day comes from 60 to 100 square miles can be photographed in a few hours' time, depending upon the scale of the map to be made. Thus, a map which in ordinary practice would require 3 years to complete, can now be made in 90 days, and the actual working time for the airplane crew, (which consists of only one pilot and one photographer) would be equivalent to less than a week if done consecutively. Experience indicates that good weather for aerial photographic work occurs on an average of one day in six, and this seems to hold good for the better part of the United States, including portions of sunny California and the arid western states.

It requires more than a commercial plane, a camera, a pilot and photographer to establish a business of Aerial Photographic Engineering. An Aerial Photographic map is more than a mere ensemble of snap-shot photos. It is, the refined product of the highest grade of engineering service and has back of it thousands of dollars spent in the training of expert technicians in flying, photography and engineering, plus thousands more spent for equipment. For instance, one plane, camera and incidental equipment costs about $30,000. Add laboratory installation and $50,000 for training of personnel and you have an idea of the primary cost. Now, allow twenty-five percent for depreciation, then for damage and loss insurance add twenty-five more, fire insurance five percent more, and for repairs add a final twenty percent. Such a staggering array of costs surely looks dis-

couraging to any fellow who possesses ambition, a second-hand Jenney and a Graflex, and who wants to get into aerial surveying. It must be admitted that this is one business that cannot be started on the proverbial shoestring.

AERIAL maps are fast becoming popular with electric companies for locating their high tension power transmission lines and for making surveys of reservoir sites; they are being used in city planning, regional planning and zoning, and for studying traffic conditions in large cities; they have been found convenient and accurate means of mapping areas where there is much water, such as harbors, tidal flats, marsh lands, and lake areas; they are being used by railroads for studying their yard problems where property values run high, and where connections with other lines, are wanted or grade crossings are to be eliminated. Aerial photography was used in mapping the mouths of the Mississippi River, a region of soft mud flats covered with tall saw grass where a surveyor can accomplish nothing; it was used in the mapping of the delta of the Colorado River, a desolate region covered with dense brush and noted for the frequent shifting of the river channels across it; it is being used by lumber companies in mapping timber lands and estimating the amount of merchantable timber; it is now being used by the United States Geological Survey in the preparation of the regular topographic sheets with which we are all familiar—one of the latest uses is in producing maps for tax assessors that enables the latter to size up the nature of the improvements on any piece of property.

It is being used today by the Alexander Hamilton Rice expedition in mapping unexplored regions in Brazil.

The Board of Estimate and Apportionment of the city of New York is now working out its plans and estimates with the aid of the big aerial photographic map of that city recently completed for it. Perhaps the most recent development in this new art is the mapping of reservoir sites for the storage of water showing so-called contours or lines of equal elevation by means of which it is possible to figure the amount of water that can be stored up to any level. The foregoing are only a few of the many different ways in which the aerial map has been found useful.

In all this work the method of procedure is to fly the airplane in straight paths, making exposures at such intervals as to secure an overlap better than one-half between consecutive pictures, and an overlap between adjacent rows of pictures of about one-half. This large overlap is needed for several reasons—First, for maintaining geometrical accuracy in putting the map together; Second—to eliminate any picture that is defective without leaving a gap; Third—for correcting the position of elevated objects that appear displaced; Fourth—for viewing the pictures under the stereoscope.

THE stereoscope is used so much in connection with aerial photographic maps. This talk would not be complete without saying a word about it. The instrument is much like the old-fashioned parlor stereoscope but is built larger so as to accommodate two 7 by 9 photographs. When properly adjusted to suit the eyes, it brings out into prominent relief the entire area that is common to two adjacent pictures. Houses and trees appear to stand upright, hilltops appear to be much nearer to the observer than the valley bottoms, and many objects can be recognized that otherwise are meaningless. The stereoscope is almost uncanny in giving a third dimension to what seems to be a flat landscape, when viewed in a single picture. It is now regarded as one of the indispensable tools for correctly interpreting and getting the full value out of aerial photographs.

Everybody is familiar with the birdseye views that are taken from airplanes by tilting the camera at any angle that may be necessary. Such pictures, called obliques, may be seen in most any periodical of today. Obliques are of the greatest value for illustrations, for advertising and also in connection with aerial maps. For instances in the case of a city, oblique pictures will show the relative heights of buildings, docks, bridges and ships, something that can only be guessed at by looking at the map.

Remarkable as has been the development of aerial photography during the past five years, there is no prophesying what the next five years will bring. Wonderful inventions and new processes are being experimented with and the time is not far distant when the older methods of surveying and map making will have been completely superseded.

Perhaps the most important of these inventions, still a secret, provides a mechanically controlled camera that will require no human attendance whatever.

Air Travel and Insurance

OF no little significance to the future welfare of civil aviation in this country is the recent address of Major General Mason M. Patrick before the 18th annual convention of life insurance presidents at New York, December 11.

Although, it has not been popularly discussed, it is a well known fact that the sooner insurance companies assume more confidence for aircraft the sooner will private interests be attracted in putting their money in aerial transport projects. If insurance rates were offered in some proportion equal to other transportation insurance risks it would effect a great stimulant to the business of inaugurating regular air lines.

European Air Lines require that all passengers sign an affidavit relieving the company of any responsibility in case of accident. With this worry off their shoulders they have an additional important item in their favor by a State or National subsidy which virtually guarantees the operator of the air line a profit on his investment.

It is little wonder then that civil air lines have not progressed in this country on a par with foreign lines which connect all European cities of importance with a regular schedule. The few privately operated air lines in America have no subsidy, or good insurance to protect them in case of reverses or accident and consequently our air lines are far behind those of Europe both in number and class. However, the Travelers' Insurance Company, Hartford Connecticut, and several others have instituted a special endorsement attached to the public liability insurance policy to cover the passenger hazard in air travel. With this endorsement, the policy protects the owner of the airplane against suits arising from injuries sustained by the public while riding in the plane. The rates of this form of coverage are a percentage of the passenger earnings, with a minimum sum per passenger trip. The maximum limits of such a policy are at present $10,000, $30,000—that is, the company will not accept a responsibility for more than $10,000 on any one person killed or injured in any one accident, nor more than a total of $30,000 in case several persons are involved in any one accident.

Individual accident insurance is issued in the form of a daily ticket policy, which becomes applicable at whatever hour the flight is started during a given day, and continues until four o'clock a.m. the following day. This ticket policy is for the principal sum of $5,000 with the usual indemnities, for dismemberment and loss of sight, and also for disabilities of a temporary character. Weekly indemnities, however, apply only where the holder of the ticket is a man. Similar tickets, with the weekly indemnities eliminated, are issued to women. This ticket-policy plan has been developed so that a similar contract may be issued to cover a trip of any proposed duration—including round trip, if that is desired—and contracts of this kind are called trip-ticket policies. The rates depend upon the length and character of the trip, and at present are largely matters of special negotiation in individual cases. There are also means provided for obtaining an annual personal accident policy, carrying a rider, permitting flight in airplanes.

Life insurance with an aircraft permit may also be obtained. It is issued in one-year non-renewable term form only, and an extra premium in addition to the term rate is charged.

The presence of General Patrick at the meeting of the insurance officials seems to indicate that the various companies are taking on a little more interest and want to know more about the status of development, and possibly offer in the near future somewhat better terms to both airplane operators and to air passengers.

SADI LECOINTE

Here we have a late photo of the naughty little French "Ace" who failed to show up at the Dayton Air Meet and placed the officials in an "International" muddle. Frederick B. Patterson, erstwhile President of the National Aeronautic Association, went all the way to Europe to induce Sadi, particularly, to participate in the great air classic. Mr. Patterson, made Sadi an inviting offer, but obviously certain foreign airplane manufacturers advised Sadi to let well enough alone so he didn't show up. Consequently pages of space were used up by our aeronautical pen-shooters to warn the public that the International Air Races were not "International" at all, but strictly "U. S." Thanks to the conscientiousness of the Aeronautical press.

A Slam at Our Friend--The Enemy

MR. L. D. GARDNER, of *"Aviation,"* hates McCook Field. Mr. Gardner hates Dayton; he hates Mr. Patterson; the National Cash Register Co., and the National Aeronautic Association of 1924. Running short of spleen last October, he imported C. G. Grey, editor of *"The Aeroplane,"* from England to help him hate American aviation.

Mr. Gardner has been harping about an Air Policy for the past year; he has written to everybody in the United States he could think of, except General Patrick and Admiral Moffatt, asking for suggestions to be incorporated in the Gardner copyrighted National Air Policy. What he has obtained thus far is a conglomerate layout of constitution, by-laws, rules, regulation, and suggestions that pertain to governmental aviation, commercial aviation, industrial aviation, and civilian aviation.

There is nothing new in Mr. Gardner's suggested policy. Some of it is pending legislation; some is actually in effect in the Government Air Services; and some of it is a little ahead of the game and is the subject of many heated discussions.

There is no denying that it is Mr. Gardner's perfect right to foster this policy propaganda, and open his columns to a discussion of the advisability of establishing a Secretaryship for Air, but the regrettable fact is that Mr. Gardner has left his readers under the impression by iterating and reiterating his slogan—"There is no Air Policy"—that the Chief of Air Service and Chief of Bureau of Aeronautics are mainly responsible.

Mr. Gardner is not fair-minded enough to clarify his meaning, but leaves the impression that American aviation is in the hands of imbeciles who have utterly failed in the administration of their offices, and squandered the funds appropriated for aviation purposes.

It is astonishing that aviation in the United States is enjoying the popular favor of the people when it is considered that one of the few papers in this country devoted to aviation prefers using its pages to besmirch the efforts of the officials of the Government who are at present administering its aviation policies. This also is his American privilege, but we, the poor dumb public, have been laboring under the impression that his magazine was for the promotion of aviation. Nothing could be further from the truth. *"Aviation"* magazine is primarily for the promotion of L. D. G.

The visit of C. G. Grey to this country as the guest of Mr. Gardner was a revelation. Up to that time we had enjoyed Mr. Grey's clever manner of poking fun at the British Air Ministry. We were lead to believe from his frank manner of expression that most of the thinking for his articles was done by C. G. Grey. Imagine our chagrin on reading his "Impression of Aviation in America," written before he saw Dayton, to find that he has discovered that the "Army seems to suffer from a place called McCook Field. Like the R. A. F. (Royal Air Forces), McCook Field costs millions of money and produces nothing."

In a previous issue of *"Aviation,"* Mr. Gardner in announcing the visit of C. G. Grey states: "It will be a great pleasure and an opportunity to open the columns of *"Aviation"* to his observations. We only hope that he will not feel that his status as a guest limits his free expression. So far as *"Aviation"* is concerned, it hopes and looks for straight from the shoulder hitting and welcomes it."

Doesn't it seem significant that Mr. Grey started to "hit from the shoulder" before he had an opportunity to get any person's version of these issues except L. D. Gardner's?

Quoting Mr. Grey: "Like the R. A. F., McCook Field spends good money, which if it were allowed to the industry would provide the flying personnel with better aircraft, and more of them."

It would be just as asinine to attempt to answer this statement without a thorough investigation, and some ridiculous assumptions, as it is to make it.

Quoting: "Furthermore, McCook Field, still more like our R. A. F., cramps the style of industrial firms by delay in approving or disapproving trade designs and so delaying the placing of orders and consequent organization for output."

As to the statement itself, it carries the usual Gardner characteristics of inaccuracy and McCook Field hate.

As a guest, Mr. Grey has proved himself a very safe and accommodating comedian. As a fearless editor, who appreciates the sanctity of uncontrolled thought, C. G. Grey has proven himself on his visit to America a total "wash out."

We will tell you more of these "gold dust twins" in the January issue of *Slipstream,* which magazine Mr. Gardner thinks ought not to be in existence because it is the only asserting voice of McCook Field and Dayton.

The American Super-Zeppelin

By P. W. Litchfield, Vice President and General Manager the Goodyear Zeppelin Corporation

EDITOR'S NOTE

In response to numerous requests from individuals interested in the plans for the design of the Zeppelin airship of more than 5,000,000 cubic feet capacity, projected by The Goodyear-Zeppelin Corp., of Akron, Ohio, Mr. P. W. Litchfield, vice-president and general manager of the Goodyear-Zeppelin Corp., has authorized the accompanying statement.

Working plans for this super-airship, to be more than twice as large as either of the United States naval airships "Los Angeles" and "Shenandoah," were started with the recent arrival in Akron of Dr. Karl Arnstein, formerly chief engineer of the German Zeppelin Company, and a selected staff of twelve technical men from Friedrichshafen, Germany, the former home of Zeppelin operations.

Doctor Arnstein, under whose direction nearly 100 Zeppelins, including the "Los Angeles," were constructed in Germany, holds a similar capacity with the Goodyear-Zeppelin Corp., a subsidiary of The Goodyear Tire & Rubber Co.

BEFORE entering into any discussion of the design problems involved in building a rigid airship of five million cubic feet or more, it might be well to answer the question of why we have started plans on a ship of this size at all.

The Shenandoah with a capacity of 2,115,000 cubic feet of gas is able, with a few intermediate stops for fuel, to make a 9000-mile journey around the rim of the nation and back. The ZR-3, or Los Angeles, flew from mid-Europe across the Atlantic to Lakehurst, New Jersey, for delivery to the United States Navy, a journey of more than 5000 miles, the longest non-stop trip ever made by any vehicle created by man.

Why should we not be content with this for the present and proceed toward the solution of whatever operating difficulties there are in the way of a ship of this size rather than to take up the project of a ship twice as large?

The most important consideration is that the airship reaches its highest efficiency in the larger units. The larger the airship is, the higher is the proportion of useful lift (freight carrying capacity) in comparison to size.

The earliest airships built by Count Zeppelin could carry only from 10 to 20 percent of their weight in freight or passengers. The ZR-3 carries between 50 and 60 percent.

Stated another way, the ZR-3 inflated with gas and under normal temperature and pressure conditions weighed when empty about 45 tons, but it was able to lift a total weight of some 90 tons, this being distributed between the large amount of fuel needed for a long non-stop flight, oil and water, crew and so on.

The ZR-3 started from Friedrichshafen with 29 tons of gasoline for fuel. A little less than 22 tons was actually used on the 5000-mile journey.

A ship twice the size of the ZR-3 would not require twice the amount of fuel or twice as large a crew, and would have a considerably larger percentage of space for passengers or mail or express matter.

A ten-million cubic foot ship could carry a proportionately greater pay load than a five-million cubic foot ship, and could fly around the world in a non-stop flight—could fly it either way indeed—around the equator or around the poles.

However it is logical to start first in the intermediate size of a five to six-million cubic foot ship and learn what problems are involved there before going to the next step.

In taking up the design of the five to six-million cubic foot ship, we are undertaking a new problem. This ship will be twice as large as any airship ever built (although Great Britain has let contracts for two five-million cubic foot ships, designing them for a closer contact with their overseas possessions with a projected route from England to Malta, then to Mesopotamia, on to India, the Straits Settlements and to Australia.)

In undertaking the design of a ship, there are various considerations that must be taken into account. Whether the first requirements of America would be for a military or commercial ship is a primary factor, involving many variations in design.

If the ship is a commercial ship built for speed, then something can be sacrificed in the pay load it may carry. If it is to be built primarily for transport and the matter of 10 or 15 miles per hour difference in the rated speed of the engines is not important, the engineers must include that fact in their computations. If the ship is designed for travel over the land, let us say between the two oceans, the altitude to be reached, the ceiling of the ship is an important factor.

For the ship starting on its return journey from Los Angeles, let's say, with fuel to carry it to New York, must carry this maximum weight over the Rocky Mountains, and in the higher altitudes the air pressure is less and the temperature is lower, both factors affecting the lifting power of the gas.

If the ship is designed for coast patrol with the fleet, making comparatively short, but fast scouting trips, it will have different requirements from a ship that is to carry passengers and mail and express across the Atlantic Ocean without opportunity for refueling enroute.

The routes to be followed and the tasks to be done by a Zeppelin ship are primary facts to be studied before the final lines of design can be settled.

However we are compelled to recognize an interest on the part of the public in the Goodyear-Zeppelin Corporation to set down working plans for the first American super-Zeppelin, and it is possible to set down in approximate figures at least the general limitations somewhere within which the proposed ship will find itself.

Let us set the capacity of the gas bags as being between five and six million cubic feet.

THE Shenandoah is 680 feet long and 78 feet in diameter. The ZR-3, or Los Angeles, somewhat shorter and fatter, is 660 feet long with a height of 101.6 feet. This gives a ratio of slenderness for the Shenandoah of 8.7, that is 8.7 times as long as it is in diameter. The ZR-3 ratio is about 7.2.

The proposed five-million cubic foot ship may be between 860 and 930 feet long, the maximum diameter 115 to 120 feet, with the overall height from the ground, that is with the control car, 10 feet higher, and with a slenderness ratio of around 7.5.

Let us set down the engines necessary to drive this big ship at 4000 horse power as against 1500 horse power of the Shenandoah and 2000 horse power of the ZR-3.

With the engines of this size a ship should develop a speed of 80 to 85 miles per hour, and driven at a maximum speed with a full fuel reserve and passengers, freight and express, should have no difficulty in making a 6000-mile non-stop flight. If driven at a cruising speed of 75 miles per hour, it could go, let's say, 8000 miles or one-third of the distance around the world without stopping.

As to the pay load, it might carry, let's say, from 50 to 125 passengers, three to six tons of mail and up to 12 tons of freight over this 6000 to 8000-mile journey.

What will the ship be like?

If it is designed for overseas transport as a commercial ship, supplementing the steamship service by giving, let's say, two-day service between New York and London for that class of passengers to whom time is important and who would make many more trips a year if they could make the round trip to Europe and back in a week or ten days. We may visualize a passenger cabin, extending along the keel of the vessel with a promenade deck and steamer chairs, comfortable berths, dining room service, shower baths and the like, furnishing a pleasant and easy journey, without seasickness or other discomforts of present methods of travel.

MANY inquiries have been made as to what the fare might be. Thousands of flights were made by Zeppelin ships across Europe before the war and for three or four months after the war until operations were stopped by the Allied Commission, and in this time some 35,000 passengers were carried without accident or mishap. The Bodensee made regular trips from the Swiss border to Berlin and occasionally to Stockholm after the war in all kinds of weather, meeting schedules, and doing this at approximately going rates for transport by train.

However I don't think that anybody is in a position yet to discuss the matter of cost of airship travel because the operating experience has been too limited to draw final conclusions.

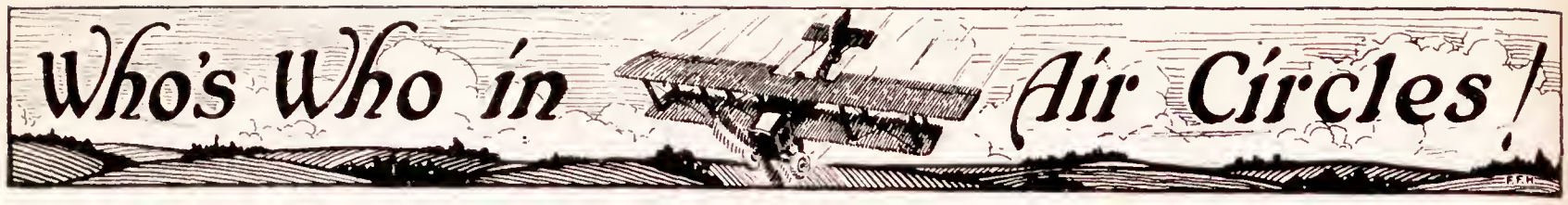
What may be said is that the Zeppelin ships offer a new and faster method of long distance transport, and that interesting developments are ahead. America is now able to draw upon the accumulated experience of twenty-five years of the Zeppelin organization in construction and operation of airships. It has the added advantage of American factory methods of construction, of American enterprise and resources and temperament, plus the fact of a great continent and two great oceans to operate over without having to cross the borders of another nation.

That there are certain problems to be solved, certain difficulties to be overcome is only added stimulus to America to proceed to gain for this country the fullest advantage of aeronautics in the way of commercial strength and national defense.

Whatever problems there are can be solved if we take advantage of the exceptional opportunity this country has, and if we face these problems with courage and faith and determination.

Officers of the Goodyear Tire & Rubber Co., which took over Zeppelin rights for North America, will serve the new subsidiary, the Goodyear Zeppelin Corporation, including E. G. Wilmer, chairman, and G. M. Stadelman, president. E. A. Lehman, formerly of the Zeppelin company at Friedrichshafen, and first officer of the ZR-3 in its trans-Atlantic flight, and Dr. Karl Arnstein, chief engineer of the original Zeppelin company, and builder of the ZR-3 and of some 100 Zeppelin ships, will act as vice-presidents of the American company.

Dr. Hugo Eckener, head of the Zeppelin plant and commander of the ZR-3 on its delivery flight, will be a member of the board of directors for Goodyear Zeppelin, the presence of these three men being assurance that the full resources and experience of successful Zeppelin operation will be at America's disposal.



Editor's Note—The "Who's Who in Air Circles" page is a new feature of the Slipstream Monthly and will be carried in each issue with little life stories of those whose names are synonymous with the Aviation World. We invite our readers to submit material for this page.

A. LEO STEVENS,
Scott Field

IN the course of one's rambles among the Air Posts of the United States, we might chance to run into an alert little man at Scott Field, near Belleville, Illinois, a Lighter-than-Air station, who seems to be here, there and everywhere telling the young aeronauts how to do things.

When this spry little man is introduced to us as A. Leo Stevens, we scratch our heads for a minute, and, then recall that we have seen his name in connection with balloon and dirigible flying from the time of Baldwin.

The fact is that Stevens began his episodes in balloon flying at the age of nine years when he ascended inadvertently in a wild balloon ride from Forest City Park, Cleveland his boyhood home. The boy Stevens, unusually interested in ballooning was assisting an English professional aeronaut who was to have taken part in a public balloon ascension. In those days it required three days to fill the bag by the old vitriol process, the gas fumes being produced by diluting sulphuric acid with water. Stevens carried water as diligently, as for the proverbial circus elephant, for which he was promised a ride in the balloon by the professor. Later it developed that the professor meant to hedge on his agreement and rather than miss his ride, after carrying some several dozen barrels of water, young Stevens got into the basket while everybody had gone to dinner. Releasing the mooring ropes he went soaring off over the lake. The story of this wild ride would require chapters to relate but needless to say he finally landed safely near Canton, Ohio, little the worse for his jaunt among the clouds. This was the making of one of the pioneer American aeronauts who later contributed much to the cause in various designs of balloons, dirigibles, parachutes and other equipment. Since that first flight Stevens has carried thousands of passengers in all parts of the United States, he has landed in the wilds of Canada on several occasions, has dropped into the ocean, spent a night floating about the Great Lakes and battling the currents to keep above the black water awaiting to swallow him up a few feet below.

In 1916, he gave up his business at New York City, and joined the Air Service and rendered valuable assistance in organizing Lighter-than-Air work in this department. Previously in 1906, he had ascended at the Monument Grounds in Washington to demonstrate to the War Department phases of work in Lighter-than-Air observation work.

But perhaps the most commendable work contributed by Stevens is in connection with the parachute pack now used as standard equipment by all U. S. Air Service aviators. Stevens has never been given proper credit for his many inventions and improvements, and possibly the least of credit is accorded for his most valuable work—the parachute pack. As early as 1873, and the time of the famous Montgolfier Brothers' experiments in hot air balloons, we read of parachutes being used and Captain Thomas Baldwin had made several jumps some years later in America. In 1911-1912, Captain Berry and Rodman Law made jumps in parachutes of the balloon style, folded into large conical containers, but it remained for A. Leo Stevens to bring out the first practical fabric pack container.

In 1912, Rodman Law made the first parachute jump from a pusher type airplane, using the free type, or manually operated parachute pack. This free type was shortly afterward discarded for a more improved and simpler balloon type pack by Stevens.

Although many new and general improvements have been made in this Stevens design he can be credited with the original work and idea.

People of Dayton, Ohio, remember Stevens as one of the pioneers who instilled both confidence and enthusiasm for aviation. When the Wright Brothers Celebration was going on at Dayton, in 1909, Stevens brought his "All America" dirigible from New York, and made several flights over the city starting from "Buck Island." Among the prominent citizens of Dayton, who

were carried as passengers on these early flights are: E. B. Weston, Geo. W. Shroyer, ex-mayor; John MacIntire, Harry Ferneding, and Carroll Sprigg. In a speech at the Dayton City Club, Stevens asserted that Dayton would be the great air port of the United States, due to its logical location and the interest of its citizens for aviation.

A. Leo Stevens now occupies the position as one of the Chief Instructors in Lighter-than-Air activities at Scott Field Post.

He recently paid a visit to Dayton and renewed old acquaintances among private citizens and with associates at McCook Field, where he was stationed for a time several years ago.

Four Flights for $10,000

As Related by Walter Brookins

Walter Brookins Seated in Pioneer Wright Brothers' Plane.

THERE are few, if any, pioneer aviators in the United States, who like Walter Brookins has such a host of stories to tell about flying in the days when the pilot slipped a couple of bicycle pants' guards over his breeches legs, turned the visor of his golf cap to the rear and went wobbling off in the air on an open seat.

While paying a recent friendly call to Walter's place of business in Dayton, Ohio, where he is now engaged in the manufacture of the famous Brookins' Oil Measure with the flexible metal nozzle, the editor of *Slipstream Monthly* had the pleasure of hearing several intimate accounts of his flying experiences back in 1909 and 1910.

Many years ago Brookins made a flight in Chicago for H. H. Kohnsaat, publisher of the Chicago Record-Herald, who had offered $10,000 for four flights, two flights on two successive days for the benefit of the Chicago public, which had often heard of, but had never witnessed a real airplane flight.

Brookins set up his tent in the middle of Grant Park, along the lake front just off Michigan Boulevard. A day or two was spent in assembling the ship and tuning up the motor. Since the payment of the money was contingent upon the prompt staging of the flights Walter had every thing ready for the time set and at 12 o'clock noon the ship left the long skids and took the air.

"There below I saw what no man has ever seen before or since—one solid mass of people—500,000 in number, the largest crowd ever brought together in the history of the world to witness a single event," related Walter between the puffs of his pipe. "No word of mine," he continued, "could possibly describe the thrill of seeing those half million upturned faces. I'll remember that spectacle until my dying day."

After sailing around for the prescribed time he started down. Then the fun began. It was found that a west wind, breaking over the high buildings on the west side of Michigan Boulevard, was turned up by the earth's surface, and was coming up in a perfect gale right over the center of the park. When the flimsy plane first hit this blast, it hoisted the ship 300 feet at a jump, according to Brookins. With this upward current directly in line over his tent, and the only landing place within miles, it placed the flyer in a curious position. The plane was headed out over the lake, and came down to about ten feet above the water and then started toward the shore with the motor wide open.

As Walter relates it, there was a whole fleet of boats riding at anchor at the Chicago Yacht Club, and these boats were right in the path of his headlong flight. There were some fancy low altitude maneuvers made to dodge the masts, and which might have ranked well with some of the Pursuit ship stunts of today as Walter tells it.

As the plane went over the shore line, the roar of the crowd could be heard above the noise of the motor. Apparently they all had gained the impression that the flyer was doing something fancy for their amusement. "And all the time I was wondering what I'd look like when they picked me up," laughed Walter.

Fortunately, the ship was brought down safely without "cracking up," but Walter says that after that he kept a good look out for that upblast which refused to let him land.

Walter Brookins was one of the very first pilots of the Wright Brothers and has flown in exhibition flights all over the United States. The Wright School of Aviation was the first of its kind in this country and well-known personages in air circles, such as Atwood, Brindley, Bonney, Beatty, Burgess, Coffyn, Captain Chandler,

Continued on page 37

The World's Flying Records

Airplanes

3 Kilometers—266.59 m.p.h. Nov. 4, 1923, Lt. A. J. Williams, U.S.N., *Curtiss-Navy Racer and Curtiss D12A Engine*

Max. Duration—36 hrs. 4 min. 34 sec. April 16, 1917, Lt. O. G. Kelly and Lt. J. A. Macready, U.S.A.

100 Kilometers—243.81 m.p.h. Oct. 6, 1923, Lt. A. J. Williams, U.S.N., *Curtiss-Navy Racer and Curtiss D12A Engine*

Altitude with Light Load—36,555 feet October 30, 1923, by Sadi Lecointe, Issy-Les-Molineau, France

200 Kilometers Triangular Course—243.67 m.p.h. October 6, 1923, Lt. A. J. Williams, U.S.N., *Curtiss-Navy Racer and Curtiss D12A Engine*

1 Kilometer—449 Kilometers—278.99 m.p.h. Bonnet, France, December 11, 1924, Benard (Ferbois) Pursuit, Curtiss Reed Propeller

Seaplanes

200 Kilometers Triangular Course—177.29 m.p.h. October 25, 1924, Lt. R. A. Ofstie, U.S.N., *Curtiss-Navy Racer and Curtiss D12A Engine*

Altitude with Light Load—29,462 feet March 11, 1923, Sadi Lecointe, Meulan, Seine-Oise, France

100 Kilometers—176.82 m.p.h. Oct. 25, 1924, Lt. R. A. Ofstie, U.S.N., *Curtiss-Navy Racer and Curtiss D12A Engine*

Max. Duration—20 hrs. 28 min. Oct. 10, 1924, Lts. Wead and Price, U.S.N., *Curtiss CS2 Seaplane*

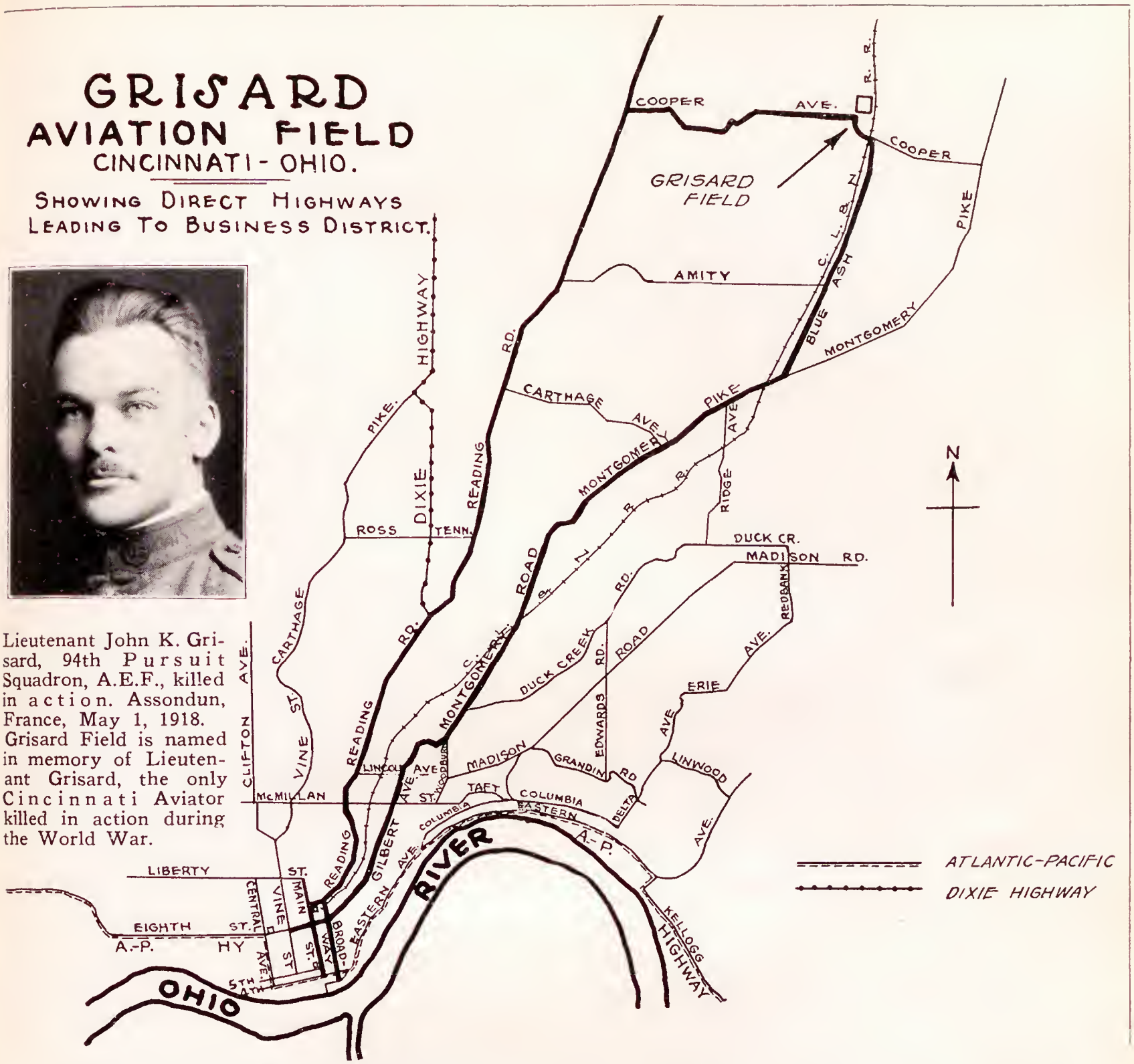
3 Kilometers—189.66 m.p.h. Oct. 25, 1924, Lt. G. Cuddihy, U.S.N., *Curtiss-Navy Racer and Curtiss D12A Engine*

CURTISS AEROPLANE & MOTOR COMPANY, INC.

GARDEN CITY, N. Y.

FACTORIES: BUFFALO, N. Y. & GARDEN CITY, N. Y.

Lieutenant John K. Grisard, 94th Pursuit Squadron, A.E.F., killed in action. Assondun, France, May 1, 1918. Grisard Field is named in memory of Lieutenant Grisard, the only Cincinnati Aviator killed in action during the World War.



GRISARD FIELD, CINCINNATI

By Howard S. Greene, Publicity Director, Cincinnati Chamber of Commerce

CINCINNATI'S interest in aeronautics was first mildly evoked when the telegraph flashed the success of the Wright's early experiment with heavier than air machines. It was not until years after, in fact, at the height of the World War that Americans and all well informed people the world over, began to take a really serious interest in the airplane, its usefulness and what might be accomplished with it both as a weapon of offense and defense and its value as a commercial asset.

The World War was responsible for bringing the airplane into its own and with that great producing industry prospering but a few miles north of Cincinnati, at Dayton, the home of the Wrights, it was only natural that Cincinnatians should manifest a very intense interest in the accomplishment of the airplane. Undoubtedly, Captain Rickenbacker, famed as the greatest of American aces accentuated the interest of Ohioans in what has since become regarded as one of the greatest inventions and developments of the twentieth century.

But a short time elapsed following the Armistice when Americans turned their thoughts toward the utilization of the airplane as a commercial factor for spanning distances. It was recognized that with its greater speed possibilities the airplane could be made to prove invaluable as a medium for transporting passengers, mail and merchandise of small bulking qualities requiring prompt delivery.

In America, this country of great distance, the subject of communication and transportation has always been one of not only the deepest interest but one which has been recognized as vitally important to the prosperity and welfare of the Nation. It is conceded that in the early days of our history, the railroads were responsible for linking the two coasts and preserving the integ-

rity of the whole. The telegraph and telephone, later day inventions were invaluable for shortening the time of communication and with the advent of the airplane and the developments which may be expected in this field the time augurs not far distant when regular passenger, and freight service may be maintained linking Atlantic and Pacific coasts with 24-hour service.

FOLLOWING the progressive march of events and the development in aeronautics, the War Department in January, 1922, brought to the attention of the Cincinnati Chamber of Commerce the importance of that city possessing a flying field large enough to adequately care for any type of ship and provide landing space for a number of planes, together with hangars, machine shops and the necessary impedimenta which goes to make up a first class flying field. Following the request received from the War Department for the Air Service of the army, James A. Reilly, then President of the Chamber of Commerce, appointed an Aviation Committee consisting of Messrs. Harold C. Eustis, Hiram S. Mathers, Albert H. Morrill, Oscar S. Barrett, Hugo Stein, Hugh P. Colville, E. C. Marshall, Warner L. Atkins, Newell H. Hargrave, M. E. Mochs, J. W. Pattison, Col. Peter E. Traub and A. L. Behymer, the postmaster. A number of the members of this committee served in the World War in the Air Service. Colonel Traub was then serving as Commandant at Ft. Thomas, U. S. Military Post, directly across the river from the city of Cincinnati. This committee proceeded to make a survey of local and surrounding territory for the purpose of securing an available site and after a careful study of the situation the committee informed the Air Service Department of the United States of America of the action taken by the Chamber following which Captain Donald C. Muse was ordered by the War Department to Cincinnati to aid the committee in securing a field. Captain Muse together with Messrs. Carl Burkhart and Dudley Outcalt, two air service reserve officers, made a full report concerning three desirable sites that would prove acceptable for general flying purposes and after further study and following recommendations of these three officers the Aviation Committee selected a tract containing approximately one hundred acres, lying immediately north of Blue Ash, parallel with the main line of the Cincinnati, Louisville and Northern Railroad and recommended its purchase. After an inspection by the Committee and Major Maxwell Kirby of the Fifth Army Corps Area, who highly recommended the site, an option was taken on the property following the approval of Major Kirby's report by General Mason Patrick, Chief of the Air Service. The property was found to be practically level, there being only eighteen feet difference between the highest and lowest points on the field and it was estimated that the cost of necessary grading, filling and other work incident to the removal of trees, barns and dwelling would not approximate more than $2500. It was ascertained that approximately $30,000 would be required for purchasing the land and making the necessary improvements and the Chamber forthwith inaugurated a campaign whereby the necessary funds were raised by popular subscription among the citizens of Cincinnati, who ever cognizant of any progressive step that might advance their city, quickly responded as they ever have in support of movements benefitting the public good.

IN order to demonstrate to the public at large the great value of such a flying field to Cincinnati and to properly impress upon public interest the importance of such a field, it was arranged at the dedication exercises scheduled for August 5, 1922, to land a number of planes and for this purpose the War Department ordered twenty-eight planes from various fields to fly to Cincinnati for that event. The field was dedicated that day and named "Grisard Field" in honor of the late Lieutenant Grisard, the only Air Service Officer from Cincinnati, losing his life in action during the World War. On that date two mail planes, the first ever to arrive in Cincinnati, landed on the field, one bringing mail from New York City having left there at 5:30 a.m. that morning and arriving in Cincinnati at 2:30 p.m. The other plane from Cleveland consumed approximately two hours in making the flight. In order to give this field a name, permission was obtained from General Patrick of the Air Service, as his approval was necessary under the circumstances.

On August 8, the Secretary of the Aviation Committee of the Chamber visited Washington for a conference with the Air Service Officials relative to the War Department equipping Grisard Field with hangars and other equipment. At the time negotiations were undertaken to secure the field at the request of the Government, the Air Service had a sufficient appropriation to supply and erect all equipment. However, that appropriation was exhausted prior to the purchase, but the Chamber of Commerce was assured by the Air Service that two hangars would be supplied if funds would be provided for bearing the expense of erection.

Following that conference a lease was drawn in favor of the United States Government and Grisard Field was leased for an indefinite period at $1.00 per year to be used by the War Department through the Air Service for governmental activities. These activities included:

(a) Training of Air Service Officers.
(b) Use of Air Service National Guard Squadrons.

Continued on page 36

Aviator's Latest Winter Garb

It is not alone the fastidious sister of fashion who claims the caressing touch of nutria, seal, fox, and mole fur trimmings, as the accompanying photographs depict.

Temperatures of 60 and 70 degrees below zero are often encountered by Government aviators during their testing sojourns to the ethereal realms six and seven miles above the earth. To ward off these annihilating frigid blasts all manner of wearing apparel has been tested with an effort to affecting a standard pattern.

A much heralded French suit fitted with wires for electric heating resulted in a near fatality to R. C. La Van, civilian tester in the Equipment Section, McCook Field, who has dubbed the outfit an "electrocuting straight jacket," and produces striking evidence in the way of a pair of scorched "undies" to verify his stand in the matter.

Fur and leather appear to be the best protection from lofty winds, asserts La Van, who is shown above displaying two late patterns of flyers' winter equipment. This two-piece design outfit was made by Spaulding Brothers, after McCook Field specifications. Both blouse and trousers have an outer shell of whip cord with an inner lining of beaverized sheep wool. Collar and sleeves are covered wtih plucked muskrat fur. The trousers, from hips to knees, have an extra covering of black dog hair while from the knees to the feet is a covering of elk hide which thus provides a pair of attached moccasins. As shown in the "opened" figure to the left, the suit is fitted with the clever hookless fastener arrangement which permits of a neat, secure method of access or removal by a simple ripping movement of a cord along the metal seams.

Spaulding Brothers are perfecting several designs of aviators' clothing equipment for the Army Air Service.

Keith's Are After "Smiling Jack"

"SMILING JACK" HARDING.

"Smiling Jack" Harding, who acted as mechanic with Lieutenant Eric Nelson, pilot of the New Orleans in the Round-the-World Flight seems to have been the favorite not alone with native "flappers" in a dozen climes but with the general public wherever the flyers landed both during and after the finish of the great journey.

Jack has a captivating way, and his clean boyish smile holds one as a good example of the genuine American youth. Full of vim and slang and a mixed Bostonian-Southern accent, it is good to hear Jack relate his experiences in that "sho' nuff" way and at the same time display his collection of gifts and souvenirs which includes everything from cut glass golf balls to Malay nose rings.

Jack is the only member of the World Flyers, who holds a civilian status, he having been called to active service as a Lieutenant upon the Reserve commission he holds. Before he was selected to take part in the flight he was employed in a civilian role at McCook Field under Lieutenant Nelson. Quick to grasp this situation, Jack was singled out by the Keith's vaudeville people as the only member of the flight group in position to accept an offer from the circuit. The Pathe News had prepared a very interesting picture of the flight and the pulling power of a member of the World Flyers appearing with the film was at once realized. It is understood that Jack was made a mighty handsome offer for a three-months' tour, but from all indications Jack does not mean to accept.

We might venture a guess that when the boys are through at Washington, where they were called to make an official record of the Flight, Jack will be found back on the job at McCook Field and enjoying betimes a lunch hour walk along "Main Street," with his best girl.

Concerning Wright View Heights

The city of Dayton and vicinity is greatly elated ove the completion of legal routine in connection with th formal acceptance by the War Department of the new site near Wilbur Wright Field, presented by citizens of Dayton to the Government, as a permanent location for the Engineering Division, McCook Field. There has recently been authorized, a $500,000 appropriation to start the removal proceedings from the present site of McCook Field, to this new and more adequate location.

Naturally, since McCook Field is now assured for Dayton, a brisk real estate development has sprung up about this "greatest flying field in the world." Possibly the most important development of this kind has been opened up recently by the International Development Company, which firm has headquarters in Dayton, Ohio. They have a very valuable tract near the new flying field, which has attracted buyers not alone among Dayton citizenry, but from many outside sources.

Recalling the rapid growth and increased value in real estate in the city of Detroit as a result of the sudden boom of the Automobile Industry during the last decade, there seems to be a wide-awake attitude among all classes who have full confidence in the future of the Aeronautical Industry in and about Dayton, "aviation's birthplace." With the Wright Brothers' Memorial project under consideration, with a twenty-acre site plotted out for this purpose, near the new flying field, and the recent establishment of a great cement factory at New Osborne, near by, it is obvious that this district is about to undergo a fine growth.

The building site being developed by the International Development Company, has in addition to its natural topographical beauty, such modern accommodations as traction and bus service. It is, on the other hand, merely a twenty-minute drive to the city of Dayton, and but five minutes drive to the flourishing town of New Osborne.

In future issues of this magazine, we hope to have the pleasure of offering more information concerning this attractive project, being instituted by the International Development Company.

Collier Trophy Award

The Contest Committee of the National Aeronautic Association, Washington, D. C., requests that this information be published in connection with the Collier Trophy award.

The Collier Trophy Committee, consisting of the following persons, Orville Wright, Godfrey L. Cabot, Dr. G. W. Lewis, Porter H. Adams and B. Russell Shaw will meet January 16, to view and pass upon the claims made by various contenders for the trophy.

It is therefore absolutely necessary, in order that all claims be heard by the committee, that such claims be in, forwarded to the N. A. A. headquarters, 1623 H Street, N. W., Washington, D. C., not later than January 12. All claims must be attested before a notary public and seal attached. In cases of special demonstrations being desired, word should immediately be sent to the committee, and if possible a representative will be on hand as witness.

Declarations of private tests and demonstrations must be signed by two responsible and representative witnesses. These men shall be outside of the organization of the contender, such as, municipal, military or naval officers or other men of prominence and standing.

Following are the provisions of the deed of gifts and a record of former awards:

The Collier Trophy, donated by Robert J. Collier, Esq., to be awarded annually by the National Aeronautic Association for the greatest achievement in aviation in America, the value of which has been thoroughly demonstrated by the actual use during the preceding year.

AWARDED IN:

1911 to Glenn H. Curtiss for hydroaeroplane development.

1912 to Glenn H. Curtiss for development and demonstration of the flying boat.

1913 to Orville Wright for development and demonstration of his automatic stabilizer.

1914 to Elmer A. Sperry for development and demonstration of gyroscopic control.

1915 to W. Starling Burgess for development and demonstration of Burgess-Dunne hydroaeroplane.

1916 to Elmer A. Sperry for development and demonstration of Sperry Drift Set.

This trophy was not awarded from 1917 to 1920 on account of the war.

1921 to Grover C. Loening for development and demonstration of his aerial yacht.

1922 to the personnel of the U. S. Air Mail Service for their wonderful achievement in completing a year's operation along the different routes from Coast to Coast—without a single fatal accident.

1923 to pilots and other personnel of the U. S. Air Mail Service for successfully demonstrating to the world the practicability of night flying in commercial transportation.

Continued from page 32

(c) Aerial Mail.
(d) A key-station in the development of assisting National Air Ways.
(e) For commercial purposes.
(f) For defense in time of war.
(g) For the development of Aeronautics.

Since the establishment of Grisard Field it has seen almost constant usage. Aerial Reserve Officers have used it for training and practice purposes and it has also been much used as a landing field for commercial purposes.

The U. S. Post Office Department has taken an intense interest in the field and the Second Assistant Postmaster General, Paul Henderson, has assured the Cincinnati Chamber of Commerce that Grisard Field will be used in connection with the establishment of a second aerial transcontinental mail line. The only established transcontinental mail line at the present time is by a more northern route and includes Cleveland, but the Cincinnati Chamber of Commerce together with Chambers of Commerce and other organizations of Pittsburgh, St. Louis, Kansas City, and Denver, are making an earnest effort to have a second air mail established to embrace those cities.

Undoubtedly, the next year or so will see the establishment of such an aerial mail route and the establishment of it together with other aerial activities will mean much to Cincinnati and will repay many times the investments which patriotic citizenry made in the purchase and establishment of Grisard Field.

Air Mail Extension to Grisard Field

A recent announcement from the Chamber of Commerce, Cincinnati, is to the effect that plans are practically completed for putting into service an air mail system between Cincinnati, Cleveland and New York. This extension line will branch off from the transcontinental air mail route at Cleveland, using Dayton Government fields as a mid-emergency station and Grisard Field, Cincinnati, airdrome as a southern terminus. Cincinnati banking institutions and agencies handling negotiable paper are highly elated over the proposed extension.

The West Side Building and Loan Association Is Noted As Among The Strongest In The State

With an uninterrupted record of nearly forty years of faithful and conservative operation The West Side Building and Loan Association has grown with the passing years until today it is regarded as one of the strongest and safest financial institutions of its kind in the State. This enviable record has been achieved by the care and foresight of its directorate in selecting men of sterling probity and keen financial acumen to guide the destinies of the institution from its inception up to the present time and while safety first has been the cardinal principle adhered to, a progressive spirit has always been maintained in the direction of affairs. As an example of this it may be pertinent to state that The West Side Building and Loan Association was the first financial institution in Dayton to introduce the popular Christmas Club saving plan, which met with well merited success and has now been adopted by many other financial depositories of the city. We commend this worthy institution to our readers as one which is fully worthy of their undivided patronage. Its new and ornate building which is a credit to the enterprise and public spirit of the west side of the city is located directly opposite to the storeroom formerly occupied by Wilbur and Orville Wright, and which may truly be termed the birthplace of aviation. To those who have the future interests of the science of aviation at heart we can state that there is no financial depository in the city which is more friendly to aviation than The West Side Building and Loan Association.

Continued from page 29

Lieutenant Arnold, Drew, Elton, Lieutenant Foulois, Fowler, Gill, Lieutenant Lahm, Lieutenant Milling, Mitchell, C. P. Rodgers, Lieutenant Rodgers, Parmelee, Page, Reynolds, Simmons, Turpin, Welsh, Webster and many others took a course in this school which used the old Wright "EX" Model for exhibition purposes.

It would be difficult to ascertain the whereabouts of these first American flyers. They have scattered to the four corners of the earth, while some of course are listed among the martyrs of the cause. Incidentally we hear that Coffyn has gone into the "Movies" while Turpin, unlike his namesake of screen-comedy fame, is a cotton broker up in Boston.

Brookins has quit flying and is now turning his mechanical ingenuity to the production of his famous oil measure which is used as standard equipment by both airplane owners, garages and filling stations. The Brookins Mfg. Co., is housed in a modern plant and is a flourishing enterprise of Dayton.

The New French Speed Record

At this writing very little definite data is available concerning the reported new French speed record made by Adjutant Bonnet at Bas Istres, near Marseilles, December 11. Latest reports give Bonnet's speed figure at 449 kilometers—(278.99) miles per hour over a 1-kilometer course which he negotiated twice in both directions before two official clockers from the Federation Aeronautique Internationale. The plane with which Bonnet made this mark is a Benard monoplane powered by a Hispano Suiza, 450 h. p., 12 cylinder engine. The Benard, we believe, is the new designation of the well-known Ferbois design. Various changes have been made, including an additional center strut to strengthen the landing gear which had proven too weak in former tests.

As we go to press we are lacking in information which would give an official verification of the new speed mark, and it would seem upon the other hand that since the 1-kilometer distance has been eliminated from the category of official records, the performance of the French contender will not be recognized.

Incidentally it is interesting to note that America has a hand in the latest remarkable speed mark with the announcement that a Curtiss Reed prop was installed.

Carl A. Schmidt

In the business annals of the Gem City there are few business enterprises which since their inception have met with a more marked degree of public favor than the well-known cut-rate drug store of Carl A. Schmidt, which is centrally located at 207 South Ludlow Street. The success of Mr. Schmidt, in his especial line of endeavor has been due to various causes among which may be mentioned, the handling of only pure and wholesome drugs, which are quoted at bed rock prices; accuracy and despatch in the filling of all prescriptions and the utmost courtesy and consideration as regards the wants of all who favor him with their patronage.

Ralph Waldo Emerson has well said, "If you can write a better book, preach a better sermon, or make a better mouse trap than your neighbor, though your house be built in the woods the world will make a beaten track to your door." And this trite quotation from our greatest essayist may literally be applied to Carl Schmidt, for the good people of Dayton have long since learned that he sells better drugs than is handled in the average drug store of the period and they have been making a beaten track to his place of business in ever increasing numbers from year to year. The prescription department is conducted in a thoroughly practical manner and accuracy and dispatch is observed in the filling of all prescriptions.

We cannot fail to compliment Mr. Schmidt upon the success which has crowned his well-directed efforts and take pleasure in commending him and his popular establishment to the favorable consideration of our readers.

Hunt Electrical Company—Experts In Their Line

Among the concerns in Dayton engaged in electrical contracting the Hunt Electrical Company, which is located at 411 North Main Street, has by the character of the work executed gained a well merited reputation for general efficiency in its especial field of electrical endeavor. Their facilities are of the best and they are prepared to execute in a thoroughly practical manner all contracts entered into, whether large or small, to the satisfaction of all concerned. All work contracted for comes under the personal supervision of John W. Hunt, the manager of the company, who is well and favorably known in the electrical world of this section as an experienced and practical electrician of well-known ability. We may add that there is hardly anything in the broad field of electrical science that he is not conversant with and associated with him are a number of capable assistants, who, under his personal supervision execute work of the highest order. In the line of electrical wiring the concern is noted for the unusual care which they exercise in their work and we can assure the property owners of this vicinity that they are running small risks of fire from defective wiring if they employ this company to do the work.

The Hunt Electrical Company has executed a great deal of electrical work in Dayton and surrounding country, their handiwork being seen to advantage in the industrial, business and residential sections of the city. John W. Hunt is not only an aviator of ability but a booster for aviation and a gentleman whom it is a pleasure to know and do business with at all times.

World's Largest Wheel

During the International Air Races at Dayton, in October of this year, thousands of people were attracted to the unusual display of the world's largest airplane wheel, a photo of which is shown above. The display, offered by the Dayton Wire Wheel Company of Dayton, Ohio, was doubly interesting because of the contrast between this latest type of airplane wheel and of the original airplane wheels which this company developed back in 1918, thus giving mute evidence of the progress and importance of modern aviation.

This giant wheel designed and built by the engineers of the Dayton Wire Wheel Company in cooperation with the authorities of McCook Field, is obviously a tribute to wheel engineering. It stands nearly six feet high, has 152 spokes, weighs 395 pounds, and is capable of sustaining a load of 60,000 pounds.

Just as Dayton is the "Birthplace of Aviation," so to, it is the birthplace of the airplane wheel industry. The engineers of the Dayton Wire Wheel Company are continually engaged in working out wheel problems for the benefit of the man who drives and the man who flies.

Recently this firm developed a new wheel for automobile use, which although identical in appearance with the artillery type wood wheel and made for either standard or balloon tires, has a steel spoke. A full description of this new and interesting feature in wheel development will be published in the January issue Slipstream Monthly.

A Growing Industry

Over on the west side, Dayton, O., at the junction of W. First, Conover and the Pennsylvania railroad tracks is located an industry which is playing an important part in the economic life of the city. We refer to The Dayton Paper Stock Company, which is operating along modern business lines and has proved a success from every standpoint. The large plant of the company is a daily repository for all the waste paper which accumulates in the city and which is here assorted, baled and shipped to the extent of over one hundred cars a month. As a clearing house for the paper mills of the Miami Valley it plays an important part in the growing paper making industry of this section. The citizens of Dayton appreciate to the full the location here of The Dayton Paper Stock Company, and the business-like methods used in its operation. Leon Slavin, under whose progressive management the industry is conducted is to be complimented upon the success which has crowned his well directed efforts.

The Grether Fire Equipment Company

Among the growing industrial enterprises of Dayton The Grether Fire Equipment Company has taken a front rank. Under competent and progressive management the concern has from a modest beginning in a small and unpretentious building, grown to its present proportions, now occupying a modern plant of 35,000 square feet of floor space. The plant is the most complete of its kind in the country specializing in Fire Department Supplies, Fire Protection Equipment and Electric Searchlights and the valued products of the company find a large and steadily increasing sale throughout all parts of the United States and Canada. Among the various articles manufactured by the company and one which is gaining rapidly is a "44" Hand Electric Searchlight which is sold at the comparatively low price of $7.50. This Utility Searchlight is from all standpoints the best of its kind manufactured and it is worth many times the price where a good reliable light is needed. It throws a beam of light from 300 to 350 feet and is wonderfully well made—only the best materials entering into its construction. Those who may need a hand searchlight which will stand up under all conditions need look no further and it may be procured at any electric shop or service station. Slipstream takes pleasure in commenting upon the splendid progress of The Grether Fire Equipment Company, which under the energetic and capable direction of William Grether has has become one of Dayton's most valued industries.

Critchfield Has Made Good

In all places of commercial importance there are constantly appearing new aspirants for public favor and patronage, and Dayton is no exception to the general rule, as many new business ventures have been successfully launched upon the sea of commerce during the current year. Among the concerns which have met with a greater degree of public patronage must be mentioned the popular Critchfield Fruit Company, which though only in operation a short time, has already gained a clientele which many older concerns in this line of trade cannot equal and this fact speaks volumes as regards the methods employed by Mr. Critchfield in the management of the business.

We desire to impress upon our readers that Mr. Critchfield has made a life study of the line of business which he is engaged in and has been for years in direct communication with the leading fruit and produce growers of the country and he buys in car load lots from the original producers, thus enabling him to quote prices which are a revelation to those who have been buying elsewhere. We can state that at his busy mart of trade at the corner of Monument Avenue and Foundry Street there is not a dull moment from early morning until late at night the splendid trade which he is the recipient of keeping the goods constantly moving. The choicest fruits, vegetables, nuts, as well as Christmas trees, are handled and sold direct from the producer to the consumer a fact which is duly appreciated by the buying public of Dayton and vicinity. The location here of this worthy enterprise has filled a long-felt want in the business life of the city and we bespeak for Mr. Critchfield continued success in its operation, both from a wholesale and retail standpoint.

The Slipstream Monthly

Dayton

January 1925

Wright Anniversary Number 1903—1925

Our Early Developments in Flying Machines
—By Orville Wright

What Chance has the Aeronautical Engineer
—By Dr. W. F. Gerhardt

The Light Plane—*By Ivan Driggs*

Development of the Curtiss-Reed Propeller
—By F. H. Russell

Features in This Issue

The NATION'S AIR CENTER

$2.00 PER YEAR

25¢ PER COPY

The Pullman of the Air

One of the thrilling sights at the International Air Races in Dayton last October was the arrival of the Stout All-Steel Air Pullman from Detroit. This magnificent plane approached the field from the North, then, like a mammoth eagle, it circled majestically over the Grand Stand and came to a graceful landing at the upper end of the field.

Here is the latest and largest airplane wheel in the world, contrasted with an early model wheel we developed in 1918. This giant wheel, designed and built by our engineers in cooperation with the authorities at McCook Field, stands nearly six feet high, has 152 spokes, weighs 395 pounds and is capable of sustaining a load of 60,000 pounds.

This Pullman of the Air carried eight passengers, luggage and sufficient fuel for a four hour flight, and yet the trip from Detroit had been made in a little over two hours.

One of the significant facts about this all- steel monster of the air is that, like many of its sister ships, it is equipped with *Dayton Wire Wheels* as a matter of safety in landing, for *Dayton Wire Wheels* do not crush.

Dayton Wire Wheels have also been used on many epoch-making flights, including the Non-Stop Coast to Coast flight, the Dawn to Dusk flight, and the Round the World Cruise, thus earning their right to a place of honor in modern aviation.

Just as Dayton is the Birthplace of Aviation, so it has become the center of the Airplane Wheel Industry, as a result of the work of our engineers in perfecting Dayton Wire Wheels—

"For the Man Who Drives or the Man Who Flies"

The Dayton Wire Wheel Company
Dayton, Ohio

Dayton Wire Wheels
QUICK DETACHABLE

ANNOUNCEMENT

The Johnson Airplane & Supply Co.

Wishes to Announce to Their Many Friends
a New Driggs-Johnson **Commercial Airplane**

BRIEF SPECIFICATIONS

FUSELAGE---------- Welded steel tubing, no brace wires.

TAIL SURFACES---- Welded steel tubing. Elevators and rudder interchangeable.

WINGS---------- Wood construction. Single bay truss.

AILERONS---------- Welded steel tubing interchangeable. Upper and lower, right and left.

LANDING GEAR---- Steel tubing. Rapid shock absorber cord wrapping. 30x5 tires.

TAIL-SKID---------- Steel tubing. Steerable.

MOTOR---------- OX-5.

FUEL---------- 30 gallon tank mounted in center section.

PERSONNEL-------- Pilot in rear cockpit. Passengers in front entering seats through roomy door in side of fuselage.

WATCH FOR FURTHER INFORMATION

This Airplane will be ready for Spring Delivery. Do not fail to see it before buying. SOLD WITH SERVICE.

In view of the above we are offering the following PLANES AND MOTORS at Sacrifice Prices

AIRPLANES

Hartzell F.C.-2, winner OX5 race St. Louis-1923, Dayton-1924, four hours fuel, two passengers and pilot, speed 97 M.P.H. ----------	$2500
New JN4D, just out of crate, ready to fly ----------	$1200
Used JN4D, just recovered and overhauled thoroughly ----------	$ 900
1924 New Swallow, new motor detachable, triplex glass cabin, aluminum wings, blue enamel fuselage and cowls, excellent condition ----------	$2500
Curtiss JN4D, reconstructed by us to carry two passengers in rear, semi-inclosed cabin. This plane has new motor and is in excellent condition, gets off ground loaded quick as Canuck	$1000
Same as above needing minor repairs, being used one season in flying condition, f.o.b. Buffalo ----------each	$ 600
Vought fuselage only no nose plate or tanks, never crashed, as is ----------	$ 75
New Standard J-1, complete in perfect condition, without motor ----------	$ 700
Canuck with all upper wings in good flying condition ----------	$ 900

MOTORS

Overhauled OX5 motors, in excellent flying condition ----------	$ 125
Used OX5 motors, in need of overhaul	$ 75
Used OXX3 motor in need of overhaul	$ 50
Overhauled 6-cylinder Benz, 120 H.P. weighs 385 lbs., complete with new Hartzell propeller, ready to install---	$ 300
Used high compression Liberty-6, 250 H.P., complete in excellent flying condition ----------	$ 400
Overhauled high compression Packard Liberty-12 motor, new electrical equipment, guaranteed perfect condition ----------	$ 800
New Anzani, 10-cylinder, 100 H.P., complete as received from government ----------	$ 200
Clergets, 130 H.P., complete as received from government ----------	$ 50
Brand new Hall-Scott Liberty-6, low compression, 200 H.P. ----------	$ 700

JOHNSON AIRPLANE & SUPPLY CO.

DAYTON, OHIO

Education in Industry

The Schoolhouse of The National Cash Register Company is an outstanding example of the dominant position that education has taken in modern industry.

Thirty years ago this company realized that its growth and progress depended largely upon the attitude of its employees toward their work.

As a result, many forms of welfare work were begun. Better working conditions were provided. Employees were urged to take advantage of the company's free night schools.

This work proved so helpful to both employees and the company that it has become one of our fundamental policies.

Welfare work and the facilities for educating employees are only a part of the many things that make our factory unusually interesting. You are cordially invited to visit us.

The National Cash Register Company
Dayton, Ohio

Aviation and Dayton

THE growth of the leading American Municipalities has been due to various causes, among which industrial expansion has been the main factor.

The wonderful development of the automobile industry was the stimulating influence which made Detroit one of the leading industrial centers of the country and the growth of the moving picture industry made Los Angeles the great metropolis of the Golden West.

Dayton harbors the distinction of being not only the birthplace of aviation, but its national center as well. This fact is fraught with immeasurable possibilities as regards its future expansion along the twin arts of peace and industry.

It is a fact worth noting that more money has been made by following up the growth of cities through the development of new industries than through any one form of investment and now when aviation is calling there is no safer, surer or more profitable investment offered than realty adjacent to the New Government Flying Field and Experiment Station.

Wright View Heights is located directly adjacent to the new flying field and embraces a tract of over 100 acres. It is regarded as one of the most desirable and beautiful locations for home purposes in the aviation district and is a suburban development that will grow with Dayton.

It is only a five-minute drive to New Osborn with its immense cement plants and the 20-acre site reserved for the Wright Memorial. Two-minute walk to traction and bus service and a twenty-minute drive to Dayton.

There is not a better opportunity to secure a homesite in the vicinity of Dayton and the future possibilities of this location is filled with great promise.

Terms are arranged, and full particulars will be sent on request or a representative will be glad to call if desirable.

THE INTERNATIONAL DEVELOPMENT CO.

J. J. Masterson, Pres. J. G. Cavanaugh, Sec'y.

816-819 Reibold Building, Dayton, Ohio

Slipstream

SLIPSTREAM—The stream of air driven aft by the propeller.

VOL. 6 JANUARY, 1925 No. 1

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879.

SUBSCRIPTION RATES:

One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL....Editor CARL SANDSTROM....Advertising Manager

CONTENTS

To the indomitable spirit of the struggling American Aircraft Industry and the utter determination of our Engineers to show the way in this new science as a rightful heritage, we dedicate this Anniversary Edition of Slipstream Monthly

The Slipstream Monthly

Published in Dayton, Ohio—"Birthplace of the Airplane"

FRED F. MARSHALL, Editor — CARL SANDSTROM, Adv. Mgr.

Vol. 6 — No. 1

-:- EDITORIAL COMMENT -:-

Publicity Not All Bad

A CONTRIBUTOR to the "National Air Policy" propaganda being instituted by an eastern aeronautical journal thinks that the "frontal attack" tactics of the interests supporting the development of aviation in this country is all for naught. Quoting the soothsayer of the said eastern medium. "It reminds one of the story of the man who tried to break cannonballs with a sledge but who found that it was much easier to fill them with water and let nature plus a cold night do the trick." We gain from this, then, that the writer means the job of boosting things along in aviation through publicity and educational factors is a lost cause and the nation needs but sit back and let this new science come into its own in natural stages of evolution. "The public must live with aviation, must see flying done without too many accidents, must see it enter its daily life, in short, must realize its service before it will become enthusiastic . . . . . and no amount of "pep" talk, hot shot editorials, wise sayings on the subject of aviation put in the mouth, or rather in the ink, of public men, by effervescent publicity men, is going to herd the public into airplanes while they still believe their necks are in danger, and in particular, when they recollect the aviation clause in their insurance policies," says the writer.

Further on in the discussion strong criticism is made against the program of the National Aeronautic Association in sending a representative into various communities making speeches and organizing chapters. "A few of the faithful sign on the dotted line," states the writer, "and activity soon dies out for lack of spontaneous spirit."

Now, it is quite an easy matter for any one of ordinary intelligence to make criticism and find fault, but the measure of real importance in a discussion of this kind is in the definite suggestions for betterment outlined in it. Generalities and rambling ridicule without substantial foundation mean nothing.

It is absurd for anyone to state that the attitude of the public does not need bolstering up from time to time with well directed publicity. True enough the public has been over-sold by the visual dreams of "effervescent" writers but better this than the lurid headlines of airplane catastrophies. If it were not for the influence brought to bear on the current press of the U. S. in furthering the cause of aviation this cause would be in a bad way indeed. One can forgive the over-enthusiasm of the reporter who announces an immediate regular airline service of Zeppelins between this country and Europe as a consequence of the ZR-3 trans-Atlantic voyage. Those who know better, pass over such sensations with a smile and those who don't know the difference are helped to forget about the depressing crashes of air mail flyers or test pilots of the Government Air Service, which misfortunes cannot be wholly eliminated now as those of us know who are in closer touch with the game.

Upon the other hand, we do not believe that the National Aeronautic Association is so wholly hopeless or useless. The organization is young yet, but there are men at the head of it now, who know something about aviation and the wants and needs of aviation people.

If the various chapters organized by the "outsider" have failed to function because "there is no strong feeling within itself that there was a need for such an organization," the case is not a hopeless one. We feel that in course of time these chapters can be called upon to do a real service for the cause of civil aviation in the U. S. These chapters are comprised of the most influential men of the respective communities and they can be relied upon to do things if called upon, especially when it means to their own interests. Perhaps before another year passes these chapters will be furnishing valuable data to the casual cross-country flyer concerning the flying fields, air routes, fuel supply, lodging, telephone service, etc., should he chance to make an inadvertent landing in a "chapter" community. In other words, it will be giving a real service after the fashion of the Auto Clubs. We believe there is a movement toward this end now on foot at the N. A. A. headquarters in Washington and erelong we will not be surprised to see our old friend, Major Schroeder, with his "official N. A. A. plane" traveling over the country helping the N. A. A. chapters get such data together for the air traveller of tomorrow. At least, isn't such a dream better than idle criticism?

The Aero Publication

QUITE a number of aviation magazines have come and gone since the time of *"Fly", "Aero and Hydro," "Aerial Age,"* and so on down the line of martyrs to the present period which marks the coming of the age of the airplane.

Of the many publications which came into existence with high aspirations in the bright outlook for a rapid expansion of the aeronautical industry, there are but four journals which can be classed as standard today and, perhaps only three which have been in publication long enough to be considered as substantial fixtures in aeronautical circles of the United States.

The sudden let up of airplane building after the great war presaged the downfall of several aeronautical journals, and those who have managed to stay in the game were only able to do so through a predominance of optimism, a willingness to spend money and a lot of patience in waiting for the "new era" in aviation.

Upon this, the 21st anniversary of the first successful

airplane flight there comes the first hopeful indication that the aeronautical journal will realize some compensation for the years of discouraging effort in keeping alive the faltering spark of light in this wonderful science.

The situation of the aviation magazine is, of course, but a parallel of that experience by the manufacturer of aircraft or of parts of aircraft. Since the one is dependent upon the other they go hand in hand with what the condition of things mete out.

However, there have been a lot of mistakes made in the past by the editors of aviation periodicals. Either through lack of experience or lack of closer contact with the industry valuable space has been used in worthless material. It costs no little amount of money to publish a magazine in any form and in this stage of affairs every bit of space should be used for timely information, and publicity for the concerns of the industry who desire and need this advertising to stimulate their business interests.

The editor of *Slipstream* has long since found that the time is not yet arrived for the "popular style" aviation magazine. For any publisher in this line to attempt a general news stand circulation at this time spells disaster for the publisher. What is needed now is strictly a magazine of the trade, and with space thrown open for all concerns of the aeronautical industry to display their wares and circulate valuable information to all those directly connected or actively interested in the development of aviation.

Since the general public is still too uneducated to understand aeronautical terms, or to grasp the meaning of a plotted curve diagram, there is no use spending a lot of money in news stand circulation and necessitating a high rate for advertising space from the not too wealthy, or overly swamped aircraft manufacturers.

Thus, at the present time, so long as the aviation magazine has a circulation broad enough to reach the little family immediately interested it is fulfilling a very creditable mission and one worthy of full support even by those more substantial corporations who, although not now actively engaged in aircraft building see many bright things to their advantage once such a thing comes into being. Here in fact, is the one unfair feature with which the publisher of the acronautical magazine has to deal. There are hundreds of our leading corporations who realize that the expansion of aircraft building and air travel means money in their own pockets but who throw up their hands in disgust when the publisher of the struggling insignificant aviation journal asks for a bit of advertising business. "Your circulation is not broad enough," is the usual reply he gets, or perhaps one such as "Our work along aviation lines at this time does not warrant any advertising in aviation journals." Therefore the way is hard for the publisher of the aeronautical magazine and the field of advertising lies with the few builders of aircraft and accessories who have government contracts, and happily a few of those who contribute chiefly out of public or civic interest.

Thus *Slipstream* launches forth upon its sixth year of existence and with the little ray of hope in the friendliness of the President and, with the increase for building purposes in the Air Service Government Budget for the current year we feel in somewhat better mood. It is hoped that before the year has expired, aviation which has just donned grown-up man's clothes will enjoy better business success, and naturally, *Slipstream* along with it.

Victory for Air Mail

The development of certain phases of aviation have been strongly opposed during the recent years in Congress, by clever men in committees and on the floor of the House. They have protested the most virtuous and patriotic of motives, and being the leaders of certain groups are in position to offer powerful opposition.

The more recent attacks of these agencies have been centered against the Air Mail Service and the appropriation allotted for the moving of McCook Field to a permanent site just east of Dayton, Ohio.

Fortunately for the general good of aviation the enemies of the two projects were beaten.

A bill was passed December 18, authorizing the Post Office Department to contract with commercial aircraft companies for the transportation of air mail. The bill was carried by a vote of 293-15 and in the face of sharp opposition. The day before, the House appropriations' committee passed favorably on the item of $2,600,000 for the operation of the Air Mail Service, and after two and one-half hours of debate passed a bill legalizing the Air Mail Service and permitting the Post Office Department to make extensions in the Air Mail Service.

Thus the Air Mail is now safely beyond danger of destruction by the interests which have always tried to ruin enterprises which interfere with their profits or their radical views of blocking all unanimous consent agreements.

Leading the fight for the Air Mail was Representative Robert H. Clancy, of Detroit, Michigan, while Representative Crampton, of Lapeer, Michigan, tried to kill the bill on a point of order.

The opposition to the McCook Field moving project was lead by Representatives LaGuardia, of New York, and Reid, of Illinois. Representative Roy G. Fitzgerald, of Dayton, successfully defended the measure supported by the entire delegation of Ohio Congressmen and Senator Fess, also of Ohio.

Alertness and vigilance is necessary to protect aviation when it has powerful organized enemies. One must learn what the enemy is doing and what he intends to do. He must have his sources of information and friends in unexpected places. Happily for McCook Field and the Air Mail it had friends who were a little more on the "inside" of things than their enemies.

Many Compete for Wright Brothers' Medal

Many papers are being submitted by notables in the aeronautical world in competition for the Wright Brothers' medal, a prize to be awarded annually by the Dayton Section, Society of Automotive Engineers.

The 1924 medal will be the first award of this organization and will take place some time this spring.

Among those who have submitted papers in the competition for the Wright Brothers' medal are: A. P. Loening, Dr. W. F. Gerhardt, Lieutenant D. L. Bruner, Morris M. Titterington, Vincent J. Burnelli, of the United States. Foreign competitors are: Albert Toussaint, director of aerodynamics, University of Paris; Heraclio Alfaro, representing the Royal Aeronautic Club of Spain; Lieutenant G. H. Reid, Royal Air Forces' Club, London; William Taylor, Scotland; and A. J. Fortescue, Sydney, N. S. W.

This medal is awarded for the most meritorious contribution to aeronautical science during the year.

Terse Remarks by the Editor

Testifying before the House Investigation Committee Lieutenants Leigh Wade and Jack Harding, Jr., of the World Flyers stated that a regular air route to the Orient is possible and feasible if a slightly altered course from that used in the World Flight is mapped out across the Northern Pacific.

As yet, of course, the Douglas Cruisers, American made airplanes are the only ones that have turned the trick in crossing the Pacific, but apparently the Japanese Government figures that German made Rohrbacks can also do it and this factory in Copenhagen is being kept busy turning out these huge machines for Japan. (But, don't term the Editor of Slipstream a Jingo.)

Quoting a "Dayton Aviation Publication," in his attack against the $500,000 appropriation for moving McCook Field included in the Air Service Budget, Representative Reid of Illinois cited the advantages which this move would gain for Dayton, as presented by the magazine, and used this as an argument that Dayton citizens merely made the gift of the new site as a good business proposition for themselves. Fortunately Representative Fitzgerald of Ohio was able to get to Washington from the operating table and swamped Mr. Reid's assertion with a broadside of arguments and proof to the contrary.

Mr. Gardner, owner of *"Aviation Weekly,"* an eastern publication, who could never see anything good in the National Aeronautical Association is now raving about the new form of the *"N. A. A. Review,"* monthly organ of this body which is distributed free to members. Mr. Gardner is obviously afraid the N. A. A. will launch forth into the advertising field and thereby dampen his own ardor for interest in aeronautics.

Congress refused to grant a cash reward to the World Flyers for their gallant service. It was pointed out, however, that the official story of the World Flight as prepared by a well known travelogue writer from data furnished by the flyers will net them something like $50,000. Then too, they have several trinkets given them by public spirited individuals and communities including, several fine new automobiles which incidentally will, at least, give the boys a certain poise of prosperity.

An English aeronautical editor terms the Barling Bomber "the ugliest Airplane in the World." We hardly think Mr. Barling should be criticised for not decorating the nose of this flying monster with embossed scroll-work. There is some satisfaction in knowing that the world, especially the European world was surprised to see it fly. One must admit the Barling Bomber does fly and could do a lot of damage if it merely hauled aloft a ton of coal and dumped it upon some unsuspecting populace. Perhaps the English are jealous because they tried to build one like it during the war and smashed it up on the first trial flight.

We are amused at the story of the lady who inquired of the McCook Field aviator: "I suppose it is rather unhandy to fix a puncture in the air?" This is almost as bad as the pretty little schoolmarm who asked one of the World Flyers the kind of gear shift used in taking off. "Standard shift," replied the Globe-Girdler pleasantly, meanwhile shifting the joy-stick through the "first," "second" and "high" movements. Fully satisfied the little schoolmarm climbed down and laughingly excused herself for punching her four inch heels through the wing covering.

We like to have our English aeronautical editors come over here to visit us but we are thoroughly disgusted to see 'em go back, stick a monocle in their eye and say we are a lot of ignoramuses with a weakness for hospitality and cheap automobiles. C. G. Grey editor of the *"Aeroplane,"* London, who visited this country during the International Air Races last fall went back home and told everybody that wherever he went a delegation of our foremost citizens marched ahead of him with a fanfare of trumpets and shouting Make Way there, Make Way, for his Bloomin' Excellency."

The editor is kept busy explaining the meaning of the term "Slipstream." We hope that some one will start a cross-word puzzle requiring this word in it but the worst of it is, old Noah Webster says there "Ain't no sech thing."

The Air Service wants some songs, says the *Air Service News Letter.* But who feels cheerful enough in the Air Service to wanta sing? suggests a Kelly Field Flyer.

Will Rodgers, the rope-slinging scribe says that in case of war we can show the enemy a list of our air records and possibly scare 'em off. He also suggests that we ask the enemy to please shoot up the Shenandoah somewhere near the ZR-3 so we can valve the helium over to her and in this way keep one of the ships available. A mighty timely thought, Bill.

When the prospective air traveler sees posted statistics to the effect that _____steen thousand passengers have been carried to every single death, he immediately figures he is the most unlucky critter in the world and hies himself to the nearest railroad station.

"Not a single development of any consequence has been produced at McCook Field during the last two years," lashed forth Representative Reid in Congress recently during his attack against this post. Some Dayton visitor in the gallery mumbled "Oh, what a lie, I saw four crops of good hay baled off'n that field last summer." But the argument wasn't heeded, or needed.

In his attack in the House of Representatives against Dayton, McCook Field and aviation in general the Honorable Mr. LaGuardia of New York discussed the building of the Barling Bomber as a needless waste of Government money. Says Representative LaGuardia. "There it is now in Dayton, worthless, useless, a big piece of incumbrance." It is the same old story of assumed intelligence upon aeronautical subjects. Had some one ventured to challenge the Gentleman from New York by the statement that our Government Engineers have learned more from tests of the "oleo" landing gear installed on the Barling Bomber than the equivalent of twice the cost of the big ship he would have gained the impression, no doubt, that we were introducing the discussion of margarine.

Amazon Flyers Survive Jungle Crash

Walter Hinton and Captain A. W. Stevens, U. S. aviators, who had been missing in the wilds of the Amazon River for ten days, returned safely to an advance camp on the Parina River, Brazil, on January 18.

The two well-known flyers, the latter from McCook Field, Dayton, Ohio, are members of the Rice Expedition, which is taking an aerial survey of the jungle region of the Amazon. A hydroplane, which was being used in this work was disabled by a landing among the rocks up the Parina River in the wilderness, and it was only through superhuman effort that the ship was repaired and placed in position for another take-off. According to the radio message which was received from the Amazon region, the two aviators were forced to live on fish and other game secured in the jungle. Friendly Indians were also pursuaded to help the airmen in their efforts to right their plane.

Hinton will be remembered as one of the pilots who flew the NC-4 Navy plane, first aircraft to cross the Alantic, while Captain Stevens is more lately identified with the famous photographing tour of the Rocky Mountains and Western Natural Park areas.

Our Early Flying Machine Developments

By Orville Wright

A view of the original Wright Glider, or motorless flying machine, 1900.

The Wright Model "A" the first successful airplane in flight at Kitty Hawk, North Carolina.

OUR first interest in aeronautics dates back as far as 1899, at which time my brother, Wilbur, and I started work on the development of a heavier-than-air machine which would be sufficiently mobile to permit of practical flying. Some of our first experiments were carried out in Dayton and others in Kitty Hawk, North Carolina. The first actual heavier-than-air machine was a glider, flown in the year 1900, at Kitty Hawk. The span of this plane was eighteen feet with a chord of five feet. Most of the experiments with this glider were made as a kite, operating the levers by cords from the ground.

In 1903, we developed a power machine having a span of forty-one feet and a chord of six and one-half feet. Inasmuch as we had previously been unable to secure a satisfactory motor for this plane, we developed and made one which met the requirements and which developed from ten to twelve horse power. The motor was of the horizontal type. The weight of the machine complete with the operator was 750 pounds. This machine made the first flight in the history of the world at Kitty Hawk, North Carolina, on December 17, 1903.

The flights of the 1902 glider had demonstrated the efficiency of our system of maintaining equilibrium, and also the accuracy of the laboratory work upon which the design of the glider was based. We then felt that we were prepared to calculate in advance the performance of machines with a degree of accuracy that had never been possible with the data and tables possessed by our predecessors. Before leaving camp in 1902, we were already at work on the general design of a new machine which we proposed to propel with a motor.

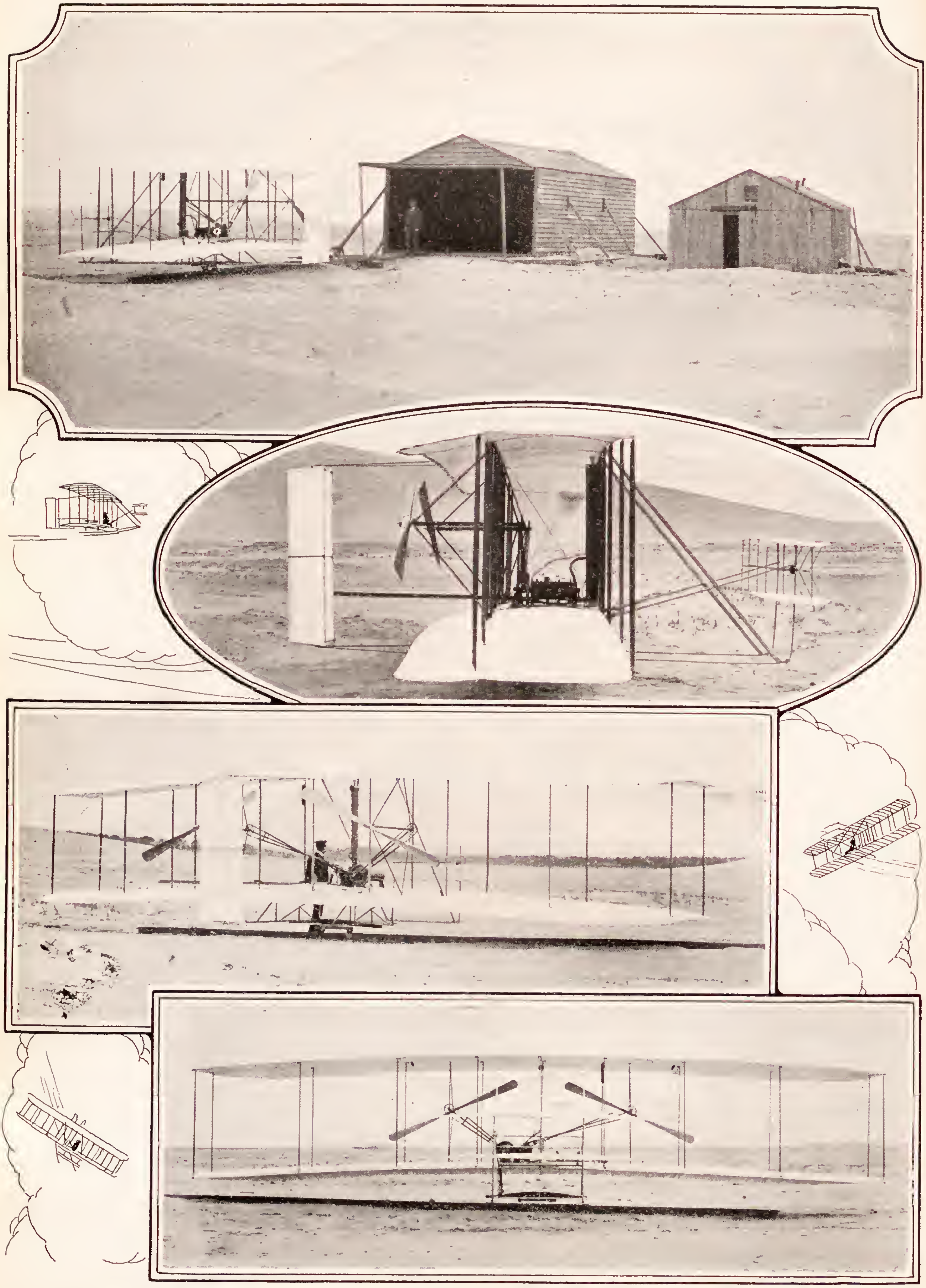
When the motor was completed and tested, we found that it would develop sixteen horse power for a few seconds, but that the power rapidly dropped till, at the end of a minute, it was only twelve horse power. Ignorant of what a motor of this size ought to develop, we were greatly pleased with the performance. More experience showed us that we did not get one-half of the power we should have had.

We left Dayton, September 23, and arrived at our camp at Kill Devil Hill on Friday, the 25th.

On November 28, while giving the motor a run indoors, we thought we again saw something wrong with one of the propeller shafts. On stopping the motor we discovered that one of the tubular shafts had cracked. Immediate preparation was made for returning to Dayton to build another set of shafts.

Wilbur remained in camp while I went to get the new shafts. I did not get back to camp again till Friday, the 11th of December. Saturday afternoon the machine was again ready for trial, but the wind was so light a start could not have been made from level ground with the run of only sixty feet permitted by our mono-rail track. Nor was there enough time before dark to take the machine to one of the hills where, by placing the track on a steep incline, sufficient speed could be secured for starting in calm air.

Monday, December 14, was a beautiful day, but there was not enough wind to enable a start to be made from the level ground about camp. We therefore decided to attempt a flight from the side



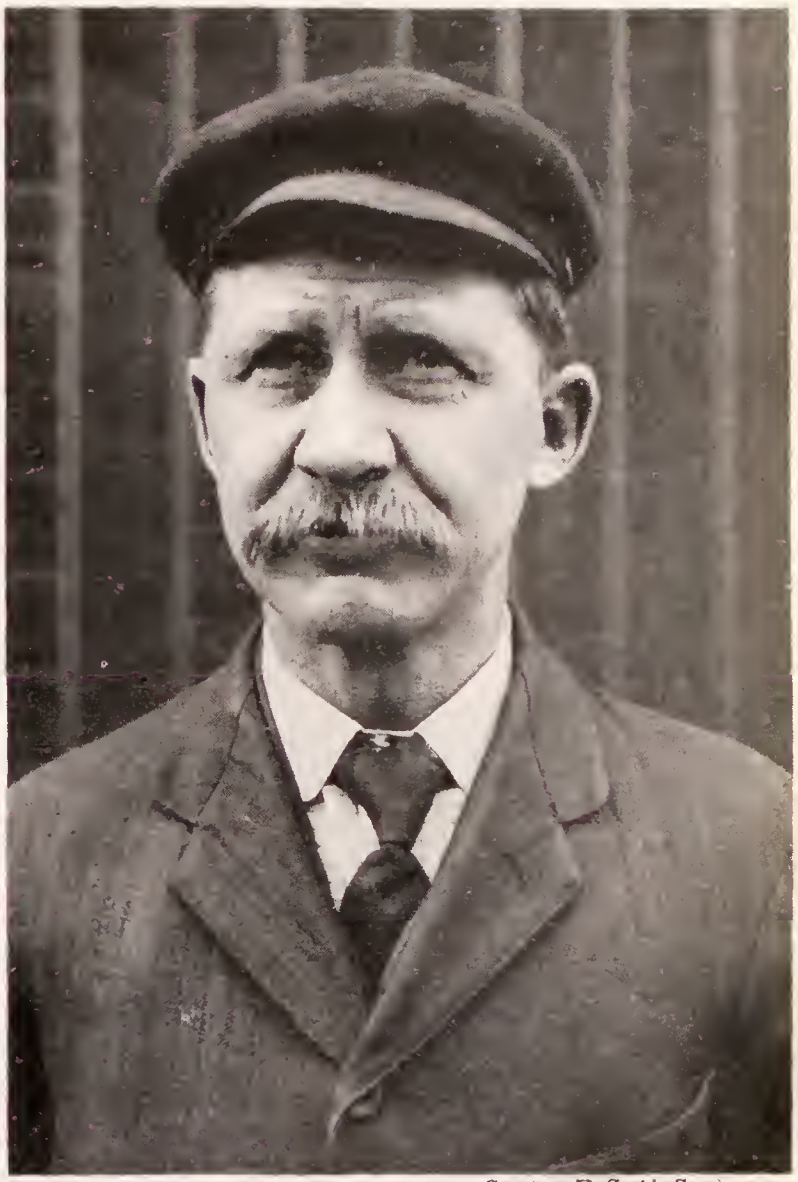
Courtesy U. S. Air Services

TOP—Wright Brothers' Camp at Kitty Hawk, N. C.—Scene of the World's first flight on December 17, 1903. The lower illustrations show different angle views of the original Wright flying machine.

of the big Kill Devil Hill. We had arranged with the members of the Kill Devil Hill life-saving station, which was located a little over a mile from our camp, to inform them when we were ready to make the first trial of the machine.

During the night of December 16, 1903, a strong, cold wind blew from the north. When we arose on the morning of the 17th, the puddles of water which had been standing about camp since the recent rains, were covered with ice. The wind had a velocity of ten to twelve meters per second (twenty-two to twenty-seven miles an hour). We thought it would die down before long and so remained indoors the early part of the morning. But when ten o'clock arrived, and the wind was as brisk as ever, we decided that we had better get the machine out and attempt a flight. We hung out the signal for the men of the life-saving station. We thought that by facing the flyer into a strong wind, there ought to be no trouble in launching it from the level ground about camp. We realized the difficulties of flying in so high a wind, but estimated that the added dangers in flight would be partly compensated for by the slower speed in landing.

After running the motor a few minutes to heat it up, I released the wire that held the machine



Courtesy U. S. Air Services

Charles E. Taylor, of Dayton, the World's first airplane mechanic.

Courtesy U. S. Air Services

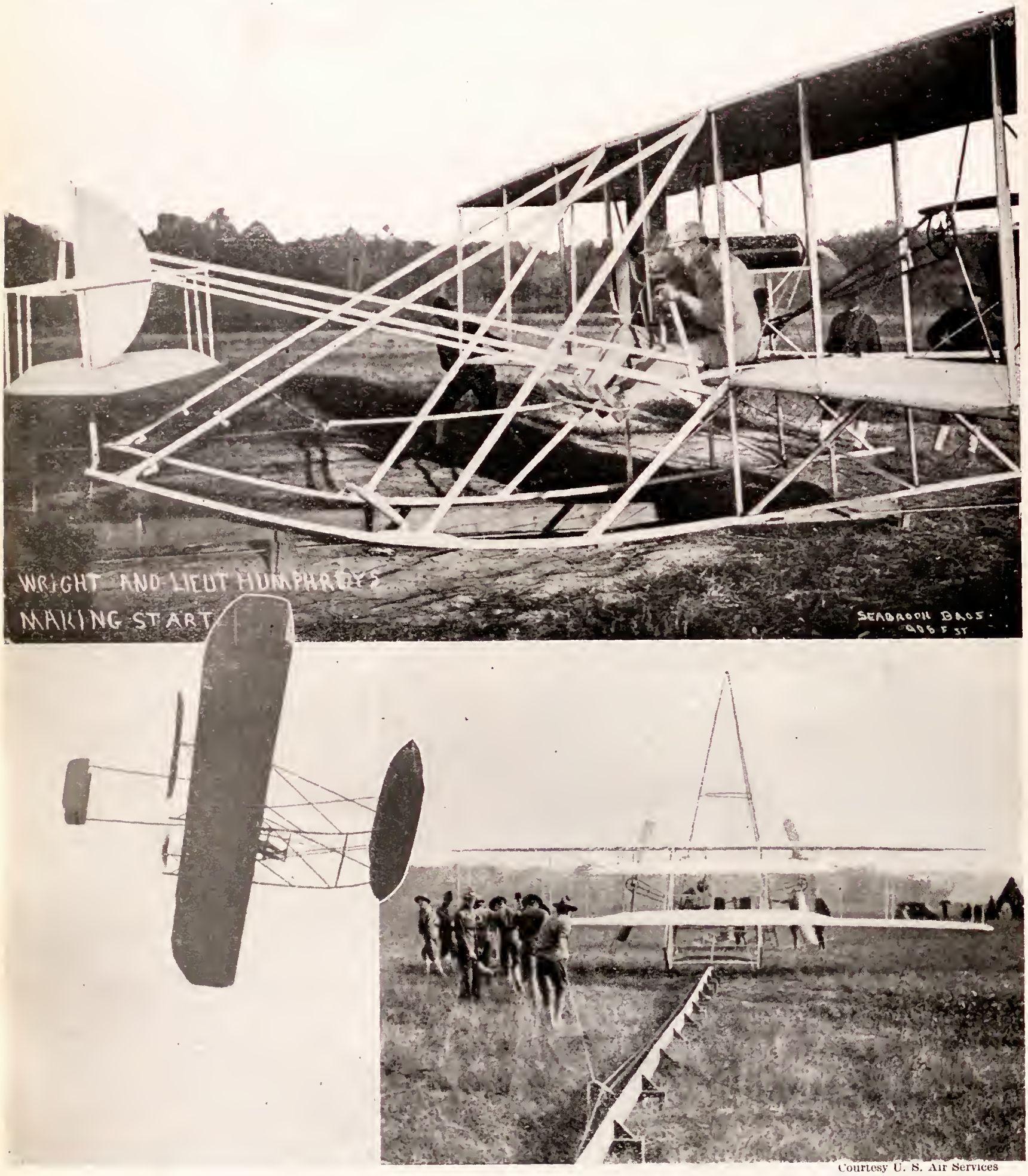
The Wilbur Wright Memorial at Le Mans, France.

to the track, and the machine started forward into the wind. Wilbur ran at the side of the machine, holding the wing to balance it on the track. Unlike the start on the 14th, made in a calm, the machine, facing a twenty-seven-mile wind, started very slowly. Wilbur was able to stay with it until it lifted from the track after a forty-foot run. One of the life-saving men snapped the camera for us, taking a picture just as the machine had reached the end of the track and had risen to a height of about two feet.

The course of the flight up and down was exceedingly erratic, partly due to the irregularity of the air, and partly to lack of experience in handling this machine. The control of the front rudder was difficult on account of its being balanced too near the center. This gave it a tendency to turn itself when started, so that it turned too far on one side and then too far on the other. As a result, the machine would rise suddenly to about ten feet and then as suddenly dart for the ground. A sudden dart when a little over a hundred feet from the end of the track, or a little over 120 feet from the point at which it rose into the air, ended the flight. As the velocity of the wind was over thirty-five feet per second and the speed of the machine over the

ground against this wind ten feet per second, the speed of the machine relative to the air was over forty-five feet per second, and the length of the flight was equivalent to a flight of 540 feet made in calm air. This flight lasted only twelve seconds, but it was nevertheless the first in the history of the world in which a machine carrying a man had raised itself by its own power into the air in full flight, had sailed forward without reduction of speed, and had finally landed at a point as high as that from which it started.

At twenty minutes after eleven Wilbur started on the second flight. The course of this flight was much like that of the first, very much up and down. The speed over the ground was somewhat faster than that of the first flight, due to the lesser



Courtesy U. S. Air Services

TOP—Wilbur Wright training Lieut. Frederic E. Humphreys, one of the two first officers in the United States Army to learn to fly; the other being Lieut. Frank P. Lahm, at College Park, Md., September, 1909.
INSERT LEFT—The Wright airplane over the field at Fort Myer, Va.
INSERT RIGHT—The monorail and catapult starting device used to launch into the air the original Wright flying machine.

Courtesy U. S. Air Services

Arch Hoxsey and his first passenger, Frank Ward O'Malley, at Asbury Park, N. J., August 20, 1910. Hoxsey's second passenger was ex-President Roosevelt.

wind. The duration of the flight was less than a second longer than the first, but the distance covered was about seventy-five feet greater.

Twenty minutes later the third flight started. This one was steadier than the first one an hour before. I was proceeding along pretty well when a sudden gust from the right lifted the machine up twelve to fifteen feet and turned it up sidewise in an alarming manner. It began a lively siding off to the left. I warped the wings to try to recover the lateral balance, and at the same time pointed the machine down to reach the ground as quickly as possible. The lateral control, was more effective than I had imagined, and before I reached the ground the right wing was lower than the left and struck first. The time of this flight was fifteen seconds and the distance over the ground was a little over two hundred feet.

Wilbur started the fourth and last flight at just twelve o'clock. The first few hundred feet were up and down as before, but by the time three hundred feet had been covered, the machine was under much better control. The course for the next four or five hundred feet had but little undulation. However, when out about eight hundred feet the machine began pitching again, and in one of its starts downward struck the ground. The distance over the ground was measured and found to be 852 feet; the time of the flight, fifty-nine seconds. The frame supporting the front rudder was badly broken, but the main part of the machine was not injured at all. We estimated that the machine could be put in condition for flight again in a day or two.

I believe that this brief account of some of our early experiences, problems, and perplexities will indicate something of the difficulties involved and the discouragements surmounted in the early days of our work to produce a heavier-than-air machine which would actually fly.

The old Wright Hangar on the Huffman Prairie, just east of Dayton, where the first Wright airplane was assembled and sheltered. This tumble-down shed, still standing, marks the authentic birthplace of the airplane.

What Chance Has the Aeronautical Engineer

Including a Brief Review of Flight History

By Dr. W. F. Gerhardt

WRIGHT BIPLANE, 1903
The first successful controlled flight of a mechanically driven heavier than air machine.

BARLING TRIPLANE, 1923
The latest successful development.

Doctor Gerhardt recently took up his duties at the University of Michigan as Associate Professor of Aeronautics. He holds the distinction of being the first engineer to be graduated from the aero department of this university. From 1917 to 1919 he received his military training in the army air service at Chanute Field, Illinois, and Fort Worth, Texas. He then took up a position as Aeronautical Engineer at McCook Field, Dayton. Here he was in charge of flight research and came into contact with the very latest developments in army and commercial aircraft. His interests and investigations in this work resulted in the production of a man-driven multiplane which he named the "Cycleplane." He received his doctors degree from the university in the summer of 1924. Doctor Gerhardt is recognized as an authority on flight testing and is now preparing a manual on the subject for official use in the U. S. air service. His personal contact with the design, flying and testing of all types of planes, makes him an enthusiastic follower of the game.

IN this article we will try to set down a few characteristics of the attitude which the student entering aeronautics may reasonably take toward his profession and in which the general public will be interested as representing his probable aim.

Naturally, the first consideration to the engineer is the material advantages that the new field offers. It is doubtful if any other technical field is at present so rich in possibilities as aeronautics. The opportunities to invent new and important apparatus, to design and produce many types of aircraft, and to organize the operation of the same are certainly without rival in engineering.

To realize the yet unsolved problems one has only to consider the historical development of the whole art and science which is in itself a fascinating study. As everyone knows the idea to fly is as old as man. The first references in literature are mythological attempts on the part of one Daedelus, a Greek architect, who sought to escape from the island of Crete where he and his son Icarus were to be served as dainties on the Minotaur's bill of fare. Realizing the hitherto unsuspected possibilities of aerial travel, Daedelus constructed for himself and his son a set of wax wings, "took off" from the scene of his imprisonment and sailed for home. Naturally we would expect the old gentleman to be a reasonably conservative pilot and that his son might be quite the reverse; so while Daedelus confined himself to a few "loops" and "Immelmans," Icarus ventured to break the altitude record. Flying too near the sun his wings melted and he plunged earthward to his death. Here undoubtedly we would find the origin of the "heroic aviator" complex.

Whatever may have been the early conceptions of aerial flight, the first to which we can give credence are those of Leonardi da Vinci, 1500, that versatile genius, who was not adverse to mixing art and science, an emulsion which seems so difficult of realization. Da Vinci sketched for us three of the possible seven types of aircraft, namely, the or-

nithopter, the parachute and the helicopter. Even though he did not go further this alone stamps him as the "grandfather" of aviation. There are further unconfirmed references in literature to gliding flights by a Frenchman by the name of DeBacqueville and an Italian by the name of Dante, contemporaries of Da Vinci, but the first successful authentic aerial voyage did not come until 1783 when Lenormand, an Italian, jumped from a tower in a parachute much like Da Vinci's design and descended safely to earth.

BUT it was not to be the heavier than air vehicle that should first accomplish an ascent. This feat in such a vehicle depended on a power plant, then still undeveloped. So the balloon, the flotation of which is independent of propulsion, took the honor of first ascending with a human passenger. What had been predicted by Sir Roger Bacon, Black, Cavallo and others was realized when the Mongolfier Brothers successfully piloted their hot air filled, paper covered bag before the awed royalty and intelligencia of Paris. Although this flight was a step in the right direction and a sporting proposition, the undirected balloon had no commercial value, and it was not until 1784, when the Roberts

BERLINER MACHINE, 1921
What may be a phase in the development of a successful helicopter-airplane.

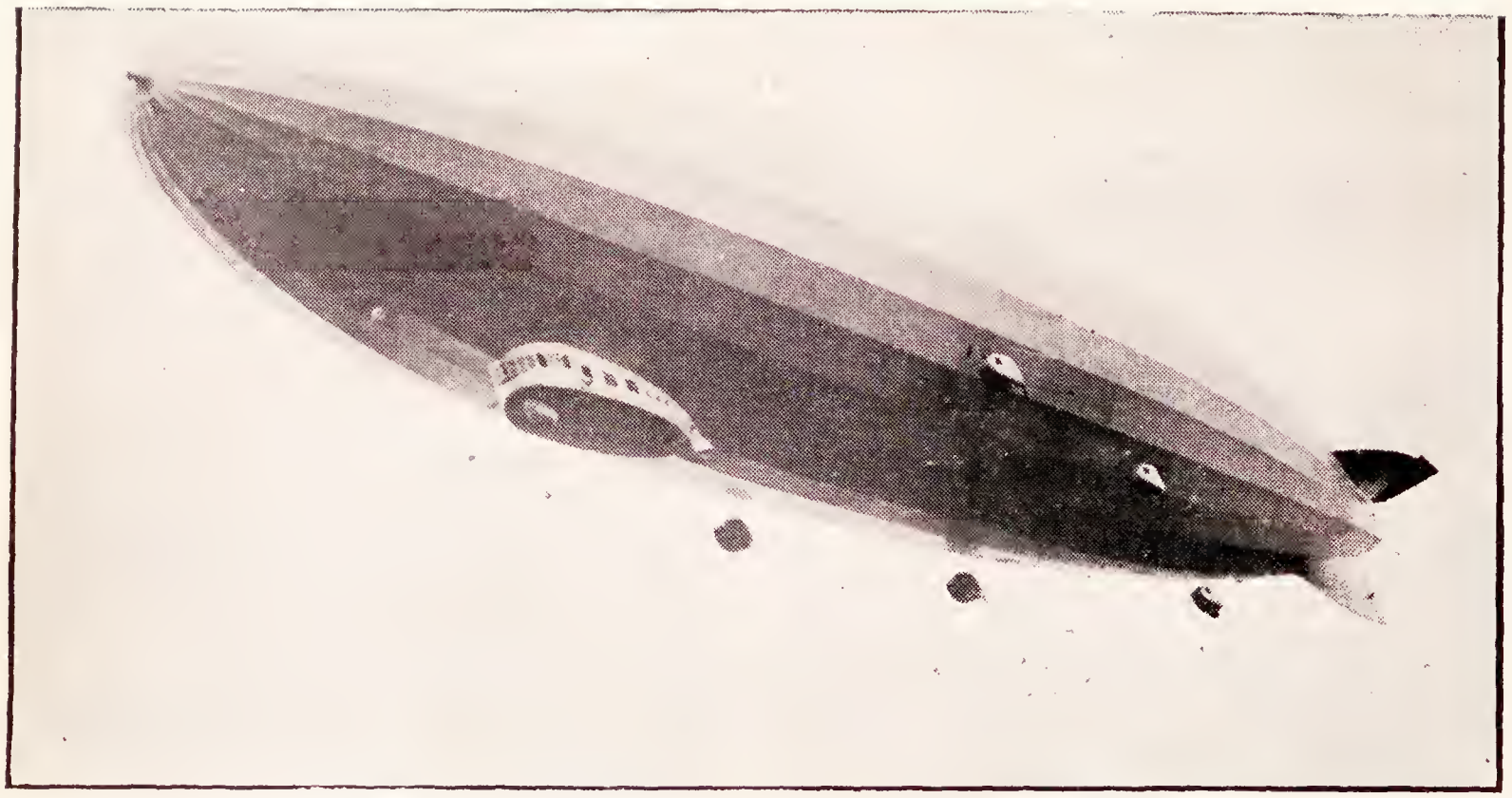
Brothers elongated the gas bag, applied their rudders and silken oars, and made short, slow, but *controlled* progress through the air, that the first real human flight can be said to have been made. Naturally human power is entirely inadequate to continued operation; we give therefore to Gifford, who in 1852 designed and built a dirigible propelled by a steam plant and propeller, the credit of making the first useful controlled human voyage.

The evolution of the heavier than air machine needs less comment than its sister craft, for events have conspired to give the airplane more attention. While the dirigible was having its early popularity, devoted experimenters were persisting with designs, models, gliders and complete machines. In the first class the names of Cayley and Hensen as inventors of the majority of the airplane devices are most worthy of mention; in the second, Penaud, Stringfellow and Langley; in the third, Lilienthal, Chanute and the Wrights; and in the last, Phillips, Ader, Maxim, Langley and the Wrights. How it was given to these last mentioned to make the first *useful controlled* flight in a heavier than air vehicle in 1903 is too well known to need more than mention. Since that time the airplane has essentially remained the airplane; the addition of lateral control, adequate power and proper dimensions which the Wright's made, definitely established the airplane as such.

KARMAN MACHINE, 1921
A probable step in the development of a successful helicopter.

THUS most of the main types of aircraft are already established but there are still a number of important problems of inventive character as yet unsolved, in connection with aeronautics. In aviation there is still the question of the relative merits of the internally braced, tapered monoplane and the externally braced multiplane. There is the problem of the development of multiple geared engines, of adjustable pitch propellers, special control systems and other devices of patentable nature.

Again the dirigible of the present day is in general principle the same as this early prototype, yet a number of detailed but important variations have taken place, the relative values of which are not yet determined. Here is a field for primary development. The question of envelope construction and bracing has split the airship builders into several schools: (1) All metal, (2) Fabric cover, rigidly fixed by metal frame, (3) Fabric cover, partially fixed by metal frame, (4) Fabric cover, non-rigid. The giant ZR-3, the latest successful development which is now famous for its trans-Atlantic trip, is an example of the third class, which has been so persistently studied by Count Zeppelin



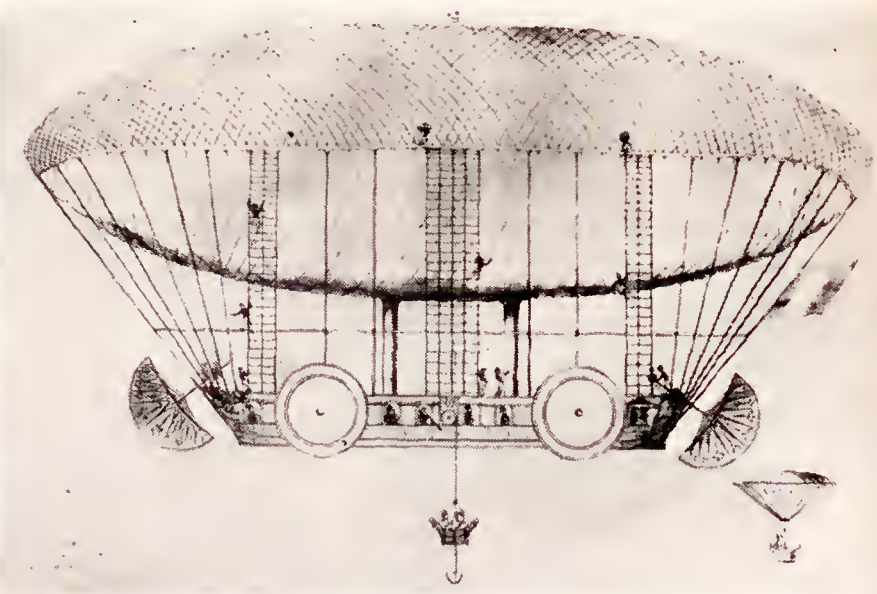
ZR-3, 1924
The latest successful development.

and his co-workers of whom Doctor Eckener is the most prominent. Mr. Ralph Upson, our own celebrated balloonist, is now working in Detroit on the first type and believes that its future is highly promising.

For those who desire more fundamental inventive problems there are the helicopter, the airplane helicopter and the ornithopter. There are good reasons to suppose that the last may never find any serious application, but the first two are certainly probable future possibilities. It is of interest to note that while Da Vinci included the helicopter in his 16th century devices, Phillips flew a model in 1896, while Cornu and Breguet succeeded in lifting off in 1898. While additional contributions have been made by Karman, Pescara, Oehmichen, de Bothezat and others, the complete useful controlled helicopter flight is yet to be made.

Concerning the airplane helicopter the field has been cultivated almost solely by Touissant and Berliner. In the opinion of many the latest form of the latter's experiment bids fair to be a complete solution.

Let us forget the whole field of equipment and accessories for aircraft. The importance of such apparatus is greater than its size would suggest, for the safety, regularity and economy of operation of aircraft, which is essential to their commercial application, are dependent almost entirely on the navigation (or rather "aerogating") instruments. In this field, into which it is impossible to enter in detail here, there are still inventions of prime importance to be made. The possibilities to realize on inventive work are quite great because airplanes



The Roberts Brothers' Dirigible of 1784

of every type will need these fundamental directing units.

These, then, are the main possibilities for radically new departures involving patentable ideas.

NATURALLY the majority of technical energy and skill in connection with aerial development will be in the details of construction and the processes of production. As we have remarked, the airplane and the dirigible are fundamentally invented and it is possible to develop a commercial program upon these approved basic ideas. The working out of the details to produce machines which fulfill the *specific requirements* of the duties which they are to perform, is an important field and one which will employ large numbers of engineers.

In this work there is the opportunity for the engineer to show his versatility in structural design.

For the big problem in aeronautics is not strength alone but strength per unit weight, and all aeronautical structures are designed with that object in view. Naturally, the development of new materials and material processes are suggested by the new conditions. There may be further important steps to be taken in this direction. Professor Pawlowski is of the opinion that some new composition, combining the strength of metal and the workability of plaster of Paris should be and can be developed; he even suggests that it may be applied like bread by moulding and baking.

There is also the possibility of a new application of production processes for the engineer who is interested in industrial engineering. This will come later when production is justified by demand, unless the hopes and beliefs of all workers in aeronautics, among them conservative engineers and business men, are quite without foundation.

THERE will be fully as interesting possibilities in the technique of aerial operations as in the other forms of transportation on sea and land. Aerial operations will be as much bigger than manufacture of aircraft as railroading is greater than the building of railroad equipment. This technique will have ramifications similar to those of the railroad business; "piloting" will be only a detail; important, but nevertheless only a detail. The best examples of aerial operations on a small scale are the air mail and the Army airways, both of which are now operating on a regular schedule day and night. This field offers the possibilities for absorbing the largest amount of personnel and the engineer who studies the engineering problem of maintenance, repair, housing, landing fields, etc., will be anticipating a large activity.

It is in this connection that business as "business" is concerned; there is no need to mention all the considerations that are involved; they are self-evident. The insurance phase is worth mentioning, for, until the insuring of aircraft and their related apparatus on a reasonable basis is accomplished, neither the public confidence nor private enterprise can permanently be enlisted. Indeed, it goes further than a mere phase of the airplane "business"; it is the root of the psychological problem of the future of aeronautics.

THE question as to the relative importance of various types of aircraft and equipment is one that puzzles the layman. It should be apparent that each will have its field and that there will be little conflict; each will be used *where the particular properties which it possesses are in demand* and where its disadvantage, though definite, will have less weight.

Mr. Steffanson, when among us, stressed the use of the dirigible in Polar flights. Obviously the lack of assurance of clear water for hydroplanes or smooth snow fields for ski-equipped planes gives any device which does not depend on the character of the ground for landing and starting, a distinct advantage. Again, since much time would naturally be spent drifting around taking observations, etc., any craft which does not take *fuel-power to hover* has the advantage. Whenever in commercial operation these conditions prevail the *dirigible* will find use.

On the other hand it is inconceivable that the average man will have money, space and skill enough to buy, house and operate a dirigible for his personal use; certainly the air "flivvers" will be *airplanes*. We can even conceive conditions which absolutely demand the helicopter, although they will be rarer than those which demand the other two forms.

But the technician in a new field who fails to see farther than the possibilities which it provides for his own little specialty is not only lacking in culture but in the ability to realize all of its possibilities for himself. So we might profitably consider the more general significance of aeronautics, its economic and political import.

THE first and most obvious result of aeronautics as at present conceived is the extension of the useful world map—the opening up to human activity of heretofore practically untouched tropical and Arctic regions. Such development may not necessarily mean habitation although this may follow for when quick ingress and egress is possible and change to temperate climates for short periods available, then individuals accustomed to temperate zones may be able to live in the extreme climates. Then, of course, some of the dangers which are now present such as malaria in the tropics, will be eliminated by aerial methods. Even now in South America, mosquito infested areas are being cleaned up by application of preparations sprayed from airplanes.

But most important, these regions will be open for exploration of natural wealth, mineral and forest. As is well known, the coal supply of our now accessible mines though they may not be exhausted in the near future, will be reduced to the point where the price of coal will reach prohibitive values. In the Arctic and in the tropics are supplies which will alleviate this condition until the problem of tapping the permanent supplies of the sun or the atom has been solved. Again the temporary solution of the problem of failing wood supply can probably be found in the tropics. Not that the meth-

od of transportating the supply itself should be done by air; it is doubtful if naval methods will ever be supplanted here but the transportation of personnel, food and other things that require speed for safety and economy will be done by air. As Steffanson so well expressed it in a lecture delivered some time ago, Magellan made the earth a "cylinder"; Wright made it a "sphere." But the most important economic result will be the "incremental freedom of action" of all human relations in the earth zones already inhabited. The airplane and dirigible will supplement the existing types of transportation and satisfy a need not already met by them in certain problems of food supply and personal communication which demand a much speedier transportation than now available.

We must remember, however, that not all problems require such speedy transportation. It is conceivable, as Doctor Lindblad suggests, that as it may even be inconvenient to get too quickly from one place to another. Suppose we have two towns separated by a distance of 500 miles and that certain business men desire to make frequent one-day trips between them. To go by railroad in twelve hours is a convenient night's ride on a Pullman; to go by air in five hours is either to break up the day or double the problem of night accommodations. In other words, the means of transportation used depends on the *local conditions.*

We must not forget the value of an air "flivver" in individual transportation. Although of less importance than the above mentioned phases, it is none the less interesting. There is, at least for the normal person, a distinct thrill in piloting or riding in an aircraft, as many times greater than that experienced in an automobile as there are increased degrees of freedom. The airplane will certainly take a place in our civilization similar to that held by the automobile.

AMONG the probable results of much speedier and nearly universal method of transportation is the alteration of political issues it will bring. If aerial transportation comes to anywhere near the scope which we have assumed, then the whole world will be so shrunken in relative size that the most intimate national and racial contact will be established. Not only will small groups be able to circulate representatives freely in all points of the world, but also great numbers of private individuals, more than ever before, will be enabled to obtain a world experience.

In this situation one group or community will no more be able to live apart, even if economically self-supporting, which *few* groups are,, than the molecules of a pool of water; what effects any one group will affect all. The thought of an intelligent individual who faces the future can no more stop short of world "state" than a ripple started by a stone dropped in the pool of water can stop short of the shore. To insure world peace it is certainly vital and necessary that there be some sort of world state organization to execute the world state of mind, but the former can never function properly in the absence of the latter. To have conceptual universality there must be universality of the impressions upon which the conceptions are based. Aviation will be one of the most important means of unhindered "universalizing" because it means *complete* communication. Radio, while vastly important, is subject to prejudiced control due to the sending limitations.

This brings us to reiterate the regret common to all intelligent workers in aeronautics, that this new science should be turned, even temporarily, from some of these primary problems. Nothing could be more indicative of the infancy of collective humanity than that the realization of man's age long dream to fly should be applied immediately as an instrument of destruction. This is inevitable because the problem of living peaceably is a broader one than that of flying and the latter takes its color from the character of the former.

It is a sad thing to realize that the necessity for military aeronautics which arose in 1914 may reoccur. The modern nation can be said to be in a position similar to that of a city built upon the banks of a river in a territory frequented by cloudbursts. Such a city, subject to damage by floods can resort to either of two solutions to the problem. The first would be to build a set of upstream dams to prevent inundation but the second and more permanent solution would be to fend off and direct the atmospheric moisture before it precipitates. Likewise the modern nation, threatened by war, can either prepare to defend itself or make ironclad agreements with other nations to remain out of war. This later expedient has not thus far been realized any more than the permanent solution to the flood endangered city, so we can be pardoned for becoming engaged in preparation for national defense, provided a reasonably proportional part of our time is spent in creative work.

If then, for the present and only in the absence of mutual agreement, disagreement must be provided for, the question becomes one of selecting the technical means which will absorb the least energy per unit effective defense. Notwithstanding, this means must be easily convertible to the arts of peace and also be practically as well as theoretically a defense measure. I think the military aeronautics

Continued on page 37

"Greater McCook Field" Remains Near Dayton

THE second session of the sixty-eighth Congress has held momentous periods for the future of aviation, and particularly for the future of McCook Field. It is therefore with a feeling of satisfaction that we know the critical situation as to the final disposition of this important post has been definitely settled in the recent passing of the War Department Appropriation Bill for Aviation, which includes an item of $500,000 to start building work on the new home of McCook Field, near Wilbur Wright Field, Dayton, Ohio.

To those of us who have kept in closer touch with this legislation we know that the very logical idea of retaining this post in Dayton, and on the 5,000 acre site donated outright to the Government for this purpose, was not carried through to success without a relentless fight in overshadowing the designing schemes of selfish and jealous agencies from other points.

The Slipstream Monthly has always defended and boosted McCook Field because the magazine originated there back in the early days of the World War and through the associations cherished by the editor who spent several years as an employee of the post in a department where he had a singular opportunity to observe the intimate developments being conducted there. *Slipstream* has defended Dayton because during these dull times in the aeronautical industry it has been public-spirited Dayton concerns which have kept the magazine in existence, and otherwise because Dayton is a friend of aviation.

However, we feel that the present issue concerning the moving and adequate expansion of McCook Field would gain the support of any fair-minded, logically-thinking person. The only reason an amendment to the Appropriation Bill was offered, and which later resulted in a heated discussion, was almost wholly traceable to one person, namely, L. G. Gardner, publisher of the *Aviation Weekly*, an eastern periodical.

For the last several years Mr. Gardner has exerted every influence he could muster in belittling McCook Field in general, and the present retention project in particular. Having in some way or other gained the rank of Major during the recent war he has used this as a sort of "pull" to gain a hearing in Government circles where he hoped to put McCook Field off the map entirely, or at least, so far as Dayton was concerned. Mr. Gardner does not like Dayton because Mr. Fred Patterson, who was elected President of the National Aeronautic Association in 1924 would not confer special favors upon *"Aviation,"* or be made a party to the various selfish schemes he proposed. As a result of his personal dislike for Mr. Patterson he has adopted the undignified and untactful method of filling his pages with accusations that Mr. Patterson played "lobby politics" to gain the retention of McCook Field in Dayton.

It appears, upon the other hand that Mr. Gardner has been lobbying a bit himself and obviously was able to dupe two of our very conscientious, but aeronautically ignorant Congressmen, to voice his scheming motives at the recent hearing on the Air Service Budget Appropriation Bill. Naturally it was not so difficult to secure the services of Representative LaGuardia, the gentleman from New York, the headquarters of *Aviation* and Representative Reid of Illinois, who perhaps was nursing the idea that there was a chance of McCook Field being moved to Rantoul, Belleville, Illinois.

From the tone of the attack instituted by these Congressmen against McCook Field and the $500,000 moving item it is quite obvious that Mr. Gardner has been schooling these prodigies with a genuine "cram" education on aeronautics. Fortunately in this instance, at least, a very, very small percentage of the entire body was half as well informed and apparently sat throughout the entire discussion in a sort of assumed air of intelligence on the details of the argument.

IT was a kind play of fate which permitted Representative Roy G. Fitzgerald, of Ohio, to recover from a recent operation sufficiently to assume his official duties in Washington and be present to defend the issue for Dayton and McCook Field, Assisting Mr. Fitzgerald there were also Congressmen Begg, Brand, Cable, Stephens, Moore and Speaks of the Ohio delegation, and even Senator Fess came over on the floor of the House to personally aid in the fight.

Congress does not hesitate to recognize Mr. Fitzgerald as an authority on aviation. He has studied McCook Field and the aeronautical situation as only few, (especially among our Government officials) have studied it. He is not wholly uninformed on the engineering phases of the work, which latter

knowledge served him well in the recent issue. Both LaGuardia and Reid assumed the role that they had a general knowledge on vital points of aeronautics. They endeavored to use this as an influence in turning the minds of the rest of the House who were less informed.

When Congressman Fitzgerald gained the floor he so thoroughly beat down the arguments of his opponents and laid before the House such a strong plea for McCook Field's retention near Dayton, that the proposed amendment to strike out the $500,000 initial expenditure toward moving the plant to the new site was killed in a sweeping victory. Both LaGuardia and Reid attempted to interrupt Representative Fitzgerald with pertinent and intimate questions from their assumed aeronautical intelligence with the result that the Ohio Congressman launched forth in a tactful broadside of comment, which not alone displayed his own general command of the subject, but disclosed the "shammed" education gained by his opponents from the schooling of Mr. Gardner, publisher of *Aviation*.

IN his attack upon Dayton both LaGuardia and Reid used quotations from *The Slipstream Monthly* to give the impression that the gift of the site was made amid "the glamour and noise of real-estate promoters, contract seekers, and business men who have only their own local interests at stake." The publisher of *Slipstream* regrets that the presence of advertising from Dayton business institutions, and real-estate firms who have developments near the new McCook Field site, resulted in furnishing material for an adverse purpose. Representative Reid quotes extensively from the June, (1924) issue of *Slipstream* wherein there was outlined the many advantages that the retention of McCook Field would bring about locally for the city of Dayton. Thus to see these men go down so hopelessly in defeat before Congressman Fitzgerald is a source of elation on the part of the Publisher of *Slipstream*, who was so inadvertently wronged by the reading of the quotations mentioned. Possibly had these gentlemen known the utter insignificance with which the magazine has heretofore been held by these larger institutions of Dayton (which these Congressmen were hitting at) they would have hesitated in using it as an authority in any other purpose. The editorial policy of any publication is guided by the elements which support it and therefore *Slipstream* can be excused for having furnished Mr. Gardner an opportunity to place in the hands of his colleagues in Washington quotations, which could be turned to give a distorted view of things, through the lack of full explanation, and consequent sympathy for the status of the magazine.

Happily, the enemies of Dayton and McCook Field were decisively beaten and *Slipstream* revels in its victory over its worst enemy, L. G. Gardner. Sooner or later we believe that aviation interests in this country will bring united pressure to bear against this detriment to the good of the cause. All he has accomplished thus far by his alleged "exposals" on waste of money, needless experimenting, etc., etc., etc.," is to arouse suspicion, not alone among our legislative bodies, but among the general public which in its woeful ignorance on the importance of this new science, both as a commercial and national defense factor, has gained the impression that our Government Air Service officials are a lot of grafters and that the whole scheme of things is all wrong. The sooner this exterminating program is instituted the better for everyone honestly interested in the future development of aviation in the United States.

Initial Expenditures on New McCook Field Site

HERE is the manner in which the first $500,000 recently appropriated by Congress for the moving of McCook Field to the new site east of Dayton will be spent on the big construction project.

Propeller test Laboratory and generator power-house foundations	$ 41,000
Utilidors	85,000
Railroads	18,000
Transformer Stands	3,000
Flying Field	10,000
Roads	18,000
Warehouse and Museum foundations	60,000
Warehouse and Museum construction (parts)	60,000
Heating Plant (Without equipment)	17,900
Main Building foundation	75,000
Four wells	4,000
Foundations for assembly, overhaul and shops	57,000
Moving that part to be done under this appropriation	10,000
Utilities	35,000
Contingent	5,100
Total	$500,000

General Patrick, Chief of the Air Service, estimates that the total cost of this project will be $4,000,000 which amount will likely be appropriated within the next two years.

The present program of preparation as outlined, according to a recent statement by Brigadier General Mitchell, who visited Dayton the forepart of January, will start in March, 1925.

Contracting for this work will, after the usual fashion of Government work, be let by bids properly advertised by the Army Air Service, and approved by the War Department.

Representative Fitzgerald Wins Fight For McCook Field and Air Defense

HON. ROY. G. FITZGERALD
Brilliant Congressman from Ohio who defended McCook Field against powerful enemies in House.

REP. F. H. LAGUARDIA OF NEW YORK
Who with Representative Reid, of Illinois, led the attack against McCook Field and Dayton in recent Congressional Battle.

The Light Plane

By Ivan H. Driggs

Designer of The DJ-I, Winner of First American Light Plane Competition

II

AUTHOR'S NOTE:—The development of Elementary Aerodynamics in the following pages is necessarily somewhat mathematical. Those readers who do not wish to follow this work may turn to the last page for a summary expressed in a few very simple rules. However, anyone familiar with elementary algebra should easily follow the mathematics as given.

THE first article of this series in the December issue of Slipstream reviewed briefly the results obtained in the development of light airplanes, both in Europe and in this country. Considerable stress was laid on the importance of the mathematical work of the staff of Göttingen University, in that it was largely the foundation of European progress. Like all good things, these theorems are very simple, both to understand and to use.

A strict mathematical proof of Doctor Prandtl's theory is quite difficult and is naturally impossible in a series of this character. Suffice to say that he applies the methods of classical hydrodynamics to fluid flow about a lifting organ, assuming that the fluid in question (air) has no viscosity, causes no friction and is incompressible. None of these assumptions are strictly true, but the deviations are so small and of such character that the truth of the theory may be demonstrated and proved by wind-tunnel tests.

If it were possible to visualize the air flow about an airplane in flight the Prandtl theory would be very easy to understand. As a wing is drawn through the air an infinite number of air molecules impinge upon its surface. If this wing is exerting a lift it naturally must be forcing these air particles downward, giving rise to the well-known "downwash" observed in numerous wind tunnel and free flight tests. This phenomenon may be demonstrated by a silk cord secured to the trailing edge of an airplane wing. In flight the cord will be seen to maintain an angle with the wing chord considerably greater than the actual angle of attack with the relative wind. This deflection of the air stream is equivalent to the airplane flying at all times in a current of air directed downward. The fact that this downward deflection is caused by the airplane itself in no way invalidates this assumption.

If an airplane is flying in such a downward current, in order to maintain level flight it must have a vertical velocity upward exactly equal to the vertical velocity of the air downward. In other words it must be climbing. This is actually what happens. The plane is continually climbing away from the air that it has passed over and thereby forced downward. Power is expended in thus causing the airplane to climb. This power necessitated to maintain the airplane in level flight in the downwash induced by its own passage through the air is called induced power. Doctor Prandtl has been able to arrive at a mathematical expression for this proportion of the power required. This formula represents the basis of the so-called Prandtl theory. It has been extended to apply to multiplanes as well as to monoplanes from which the original expression was derived.

Let W = Weight of airplane in pounds=Lift.

S = Span of airplane wing in feet. (Average in case of biplane with uneven wings.

V = Velocity of flight in miles per hour.

D = Density of the air at any altitude relative to that at the ground (always unity or less).

P_{IND} = Induced power required as explained above.

$$\text{Then } P_{IND} = \frac{W^2}{3S^2DV} \text{ for a monoplane.} \quad (1)$$

$$P_{IND} = \frac{W^2}{3.6S^2DV} \text{ for a biplane (approximately).} \quad (1a)$$

Formula (1) however does not represent the total power required for flight. As pointed out previously the assumptions under which the induced power has been calculated by Doctor Prandtl do not coincide absolutely with the actual facts. He was forced to ignore the friction of the air on the wings as well as other slight discrepancies. At the present time a wind-tunnel test is the only means available for determining the magnitude of the power necessary to overcome this added wing resistance. Tests on numerous airfoils have shown that this frictional resistance, or Profil Drag as it is called, is very nearly constant for all angles of attack in the ordinary flying range. It increases slightly at the lower and higher angles. Extensive wind-tunnel tests have shown that this Profil Drag does not vary exactly as the velocity squared as ordinarily supposed but at a somewhat lower rate. This gives rise to the so-called Scale Effect mentioned in numerous aeronautical works. The wing Profil Drag is entirely parasitical in its action as it contributes nothing to the usefulness of the airplane. The power expended in overcoming this form of resistance may be called the Wing Parasite Power.

Let $P_{W.P}$ = Wing Parasite Power.

K = Coefficient depending upon the airfoil used. To be determined by wing turned test.

= (Profil Drag of 1 sq. ft. of wing area at 1 mile per hour.)

A_W = Area of wings in square feet.

$$\text{Then } P_{W.P} = \frac{KA_WV^3D}{375} \quad (2)$$

IN the foregoing paragraphs the power required by the wing alone has been developed. There are always certain other structural parts necessary for bracing or containing the power plant and useful load. These bodies also absorb power when propelled through the air. This proportion of the power required may be called the Structural Parasite Power to differentiate it from the Wing Parasite Power. The magnitude of the Structural Parasite resistance is the most difficult to obtain. Probably the most accurate method is to test a scale model of a proposed airplane in the wind tunnel for resistance at various angles of attack. If a wind-tunnel test is out of the question the resistance of all items exposed to the air stream may be calculated by referring to experimental data on similar shapes. The laboratories of various countries have tested great numbers of fuselages, wheels, wires, struts, etc., and have published the data on those objects in a form convenient for ready use. After the resistance of each item has been found as above, the total resistance is the sum of all the small components. Probably the simplest way to arrive at the magnitude of the Structural Parasite resistance is to estimate it by comparison with airplanes of similar type which have had coefficients experimentally derived by flight test. This is most conveniently done by imagining all the miscellaneous structural items to be replaced by a flat plate of such area that the resistances at any given velocity will be identical. A table of such flat plate areas of equivalent Structural

Parasite Resistance may be easily calculated from published tests on different airplanes. When this equivalent flat plate area is determined, whether by tunnel test, calculation, or by estimation the Structural Parasite Power may be expressed as in formula (3).

Let $P_{S.P}$ = Structural Parasite Power.

$A_{P.S.}$ = Area of flat plate of resistance equivalent to structural bodies.

$$P_{S.P} = \frac{.00327 A_{P.S.} V^3 D}{375} \qquad (3)$$

Formulae 1 (or 1a), 2 and 3 may now be added to give an expression for the total Power Required—P_R.

$$P_R = \frac{.00327 A_{PS} V^3 D}{375} + \frac{K A_W V^3 D}{375} + \frac{W^2}{3 S^2 V D} \qquad (4)$$

If $\frac{K A_W}{.00327} = A_{PW}$ = The area of a flat plate of equal resistance to the wing profit drag.

and if $A_P = A_{P.W.} + A_{P.S.}$

Formula (4) may take this simplified form:

$$P_R = \frac{.00327 A_P V^3 D}{375} + \frac{W^2}{3 S^2 D V} \qquad (5)$$

$$P_R = .00000872 A_P V^3 D + \frac{.333 W^2}{S^2 D V} \qquad (5a)$$

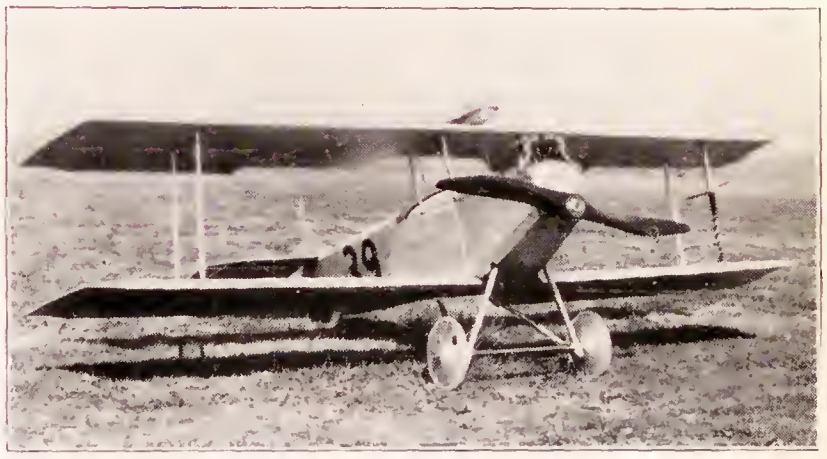
Equation (5) is very simple when compared with the ordinary procedure of calculating the Power Required Curve. One of the accepted methods is to start from a tunnel test on the chosen airfoil and apply to it various corrections for aspect ratio, gap chord ratio in case of a biplane, stagger, wing tips, etc. From the chosen wing area and weight the velocity is computed at a series values of the lift coefficient corrected from tunnel test. Then from the values of $\frac{L}{D}$ obtained after corrections at the above lift coefficient the wing drag and then the wing power is computed. The Parasite Power is then calculated and added to that of wing to give values of the Total required at various velocities. If the same quantities were used as in calculating power by equation (5) and if an extension of Doctor Prandtl's theory were applied to correcting for aspect ratio, etc., the curves of Power Required in both cases would be identical. The labor expended however in using (5) is infinitely less. This however, is not the only advantage of the above application of Prandtl's theory. In formula (5) every quantity that affects the power required for flight is shown in its proper relationship to every other. There are no coefficients to confuse and emphasize the wrong quantity. Every item but one is accurately known, assuming that the power is required at a given velocity and air density. The value of A_P, the parasite area, is the only quantity that must be determined either experimentally, by calculation or by estimation. This difficulty however is experienced by all methods equally. A further advantage lies in the fact that the principles of mathematics may be applied to manipulate equation (5) into different forms and show various laws that have not been clearly expressed previously. This work will not be carried out here, due to the fact that an attempt is being made to keep this series as simple as possible. Suffice to say that by applying the principles of differential calculus the following may be demonstrated.

I. At the speed of minimum power required the Induced Power is three times the Parasite Power.

II. At the speed of minimum drag the Induced Power and Parasite Power are equal.*

*Footnote.—Differentiate (5) with respect to V and place differential equal to zero for the speed of minimum power. Divide (5) through by V and multiply by 375 to reduce to equation of

The interesting English light plane "Cygnet 1" built by the Hawker firm. Captain Longton, pilot is shown beside the plane.



The Snyder light plane built by Orville Snyder, a McCook Field mechanic.

A close-up of E. Dormoy seated in his "Flying Bathtub" which created a sensation at the Dayton Air Meet.

The English Short "Satellite" light plane in flight during the competitions at the Lympne aerodrome.

drag. Differentiate this equation with respect to V and place differential equal to zero for the speed of minimum drag.

THEOREM I applies to questions of duration, least sinking speed for a soaring machine and to ceiling, while Theorem II is important for range of flight and best gliding angle. There rules show the very marked influence of induction on airplane performance, especially in the design of light planes, and gliders. The induced power at any speed and air density is determined solely by the ratio of weight to span, $\frac{W}{S}$. Herein lies the most important fact relative to Light Plane design. A span loading, $\frac{W}{S}$, of 20 pounds per foot on a 500-pound light plane means but a span of 25 ft. **The same value of $\frac{W}{S}$ on a 4000-pound airplane calls for a span of 200 ft.** Such a spread is impossible without excessive wing weight and almost impossible maintenance and hangar conditions. The limit of span for 4000-pound ships in prcatical use is approximately 50 feet. Therefore $\frac{W}{S} = 80$ pounds per foot. Since the Induced Power varies as $\left(\frac{W}{S}\right)^2$ from formula (1), for the 500-pound light plane this portion of the power required will be $\frac{1}{16}$ as great as for the larger ship. If the propeller efficiencies are the same in both cases the power available, and general performance of the two airplanes would vary somewhat as below:

4000-pound Airplane	500-pound Light Plane
Span, 50 feet.	Span, 25 feet.
$\frac{W}{S}$, 80	$\frac{W}{S}$, 20.
Power Available, 400 H.P.	Power Available, 25H.P.
Absolute Ceiling, 19,000 ft.	Absolute Ceiling, 19,000 ft.
Rate of Climb, 1200 ft. per min.	Rate of Climb, 600 ft. per min.
$\frac{W}{P}$, 10 lbs. per H.P.	$\frac{W}{P}$, 20 lbs. per H.P.
Parasite Area, 16 sq. ft.	Parasite Area, 1 sq. ft.
High Speed, 120 miles per hour.	High Speed, 120 miles per hour.
Parasite Area, .004. / Weight.	Parasite Area, .002. / Weight.

In the foregoing example the Parasite Power has been assumed to vary in the same ratio as the Induced Power. This assumption is not justified by the facts in the case. The wing parasite will probably vary directly as the relative weights of the two airplanes. The structural parasite may or may not vary in some such ratio, probably, however, it will never decrease faster than the ratio of weights. If such be the case the value of A^P for the light plane becomes 2 sq. ft. and the high speed becomes 95 miles per hour approximately. Very little effect will be noticed in the rate of climb and ceiling, however, since the lowered propeller pitch used with the lower high speed will probably increase the Power Available at lower speeds sufficiently to compensate for an increase of Parasite Power, which has a relatively small effect at lower speeds.

The simple example given brings to light another important fact. **In order to obtain the maximum utility out of these ships the Parasite Area should be reduced**

Continued on page 33

A close-up view of H. C. Mummert seated in the cockpit of his light plane.

A Beardmore light plane built in England. Pilot M. W. Piercey is shown by this interesting ship which showed up well in the recent Lympne Light Plane contest.

The "Flying Bathtub" rounding the pylon at the International Air Races, Dayton, Ohio.

Crowds attending the Light Airplane trials at the Lympne aerodrome (England)

Development of Curtiss-Reed Duralumin Propeller

THE CURTISS-REED PROPELLER

THE Curtiss-Reed propeller invented and patented by Dr. S. Albert Reed, a retired Engineer of New York, has been referred to by several high authorities (Fokker, Thenault) as the first important advance in propellers since the wood laminated propeller became standardized. It is quite radical in its novelty, being made from a single piece of rolled and annealed duralumin plate $\frac{7}{16}$" to 1¼" thick; (depending on diameter and power absorbed) tapered; camber faced and twisted and then heat treated, a shaft hole drilled and finally mounted on a hub; the result being a single piece metal propeller without hollow spaces, welds or rivets. For convenience of rapid introduction it has hitherto been made interchangeable on the same hub as used by the wooden propeller which it replaces, filler blocks being placed between the hub flanges and the propeller face. But there is a gain in simplicity and a reduction in weight by using a special steel hub fitted to the propeller, this type is now to be introduced. Variation for special purposes are a separate blade type, an adjustable pitch type, also 3 and 4 blade propellers, etc.

This type of propeller was made possible largely by Doctor Reed's discovery that with duralumin or similar alloy propellers of proper design, the twists imparted to produce pitch were permanent under service conditions, and did not straighten out even if the propeller were quite thin. Doctor Reed became aware of this fact in 1917 while experimenting with apparatus somewhat analogous to the Siren and he soon afterwards diverted his attention entirely to developing a propeller based upon this quality of duralumin. After small model experiments with propellers in his own laboratory he completed the series at the factory of the Curtiss Aeroplane & Motor Company, Inc., with full sizes and powers, and made there his first flight test August 30, 1921, with a 9 foot duralumin propeller, on a Curtiss standard 160 h.p. airplane with full success. The pilot "Casey" Jones reporting an improvement in speed over previous records, with wooden propellers. On December 3, 1921, the same propeller had a successful 30 hour ground test at 50% overload at McCook Field, reported in Report DWT 393 and the propeller is still in flying service.

During 1921, Doctor Reed also made 2 propellers, successfully flown on a JN4D (OX-5 motor) and in 1922, numerous others were made for various types of planes and engines and several were sent to McCook Field for test. One Reed propeller was also sent in 1922 to France and another to England for Government tests..

In 1922, the Curtiss Company took a license from the United States for these propellers and have since that time made rapid and extensive progress in introducing the Curtiss-Reed propellers. This company early saw the high promise of the Reed propeller for racing purposes and their foresight was justified by the fact that in 1923 world's speed records for land and sea planes were won by Curtiss planes and engines with Curtiss-Reed propellers. Doctor Reed's foreign Government tests having been successful he began arrangements for foreign manufacture and gave a license under his foreign patent to Mr. P. Levasseur in France and the Fairey Aviation Company, in England both of whom are now on a full production basis. The remaining important foreign countries will be covered very shortly by similar license contracts.

In April, 1924, Mr. Levasseur was requested by the Bernard-Hubert interests to provide a Levasseur-Reed propeller for their new racer, and by collaboration in design of Mr. Levasseur, the Curtiss Company and Doctor Reed, this propeller was ready the middle of the summer; and on November 11, 1924, the plane with the same propeller won the French Speed record, and on December 11, 1924, it won the World's speed record at Istres, 278 miles per hour. It may be some consolation to America therefore that though they have lost the previous world speed record made by Lieut. A. J. Williams, an American invention and design contributed materially to the result.

In 1924, after numerous trials the air mail decided to equip its entire service from Coast-to-Coast with Curtiss-Reed propellers used on DH-4 Libertys and the necessary propellers have now gone into service. The 15 Army Curtiss PW-8 Pursuit planes have used these propellers continuously for a year and several Reed propellers supplied to the Navy early in 1923, have flown more or less continuously ever since.

The more obvious merits of this propeller are in its extreme simplicity, durability and capability of repair and restoration if bent by bad landings, but its chief distinction is in the material gain in efficiency over wooden propellers and its capability of use at tip speeds beyond the practical limits for wood propellers and thus giving larger scope for general design of any flying unit.

Doctor Reed approached this problem from a novel standpoint. He was not seeking to make a good metal propeller, but was interested in blade forms adapted for super-speeds, say over 900 ft. per second, to the above the velocity of sound taken at 1100 F.P.S. Investigation showed that above 900 F.P.S tip speed, wood propellers fell off rapidly in efficiency and furthermore that experimental aerofoil data had never reached higher than a wind speed of 654 ft. per second (465 miles per hour). Wooden propellers at these high velocities are also unsafe for use. His experiment while on the research in sound had convinced Doctor Reed that above 800 F.P.S. the behavior of the air to moving bodies began to change, not merely in degree but in character and his conclusion was that the usual plan in aerofoil tables of scaling up from data of lower wind speeds in wind tunnels was probably fallacious and based upon an assumption of uniformity which was un-

warranted, and he found justification in this view in the results of recorded observations of bullets in flight.

The particulars of his line of reasoning may be found in a paper written by him and published by the N.A.C.A. in Technical Note-168-1923. Therefore Doctor Reed was led to knife-like sections at the higher radii of blades for these super-speeds and his aim was to carry these knife-like sections at a constant pitch angle and yet not to exceed the weight and other features required in practical flying.

His views may be regarded as fairly justified by the fact that propeller blades of the Reed type have advanced propeller efficiencies from 70's to the 80's and have made tip speeds of at least 1100 F.P.S. practicable.

In 1922, Doctor Reed made a series of 3-foot models for official windtunnel tests by the N.A.C.A. at the Aerodynamical Laboratory of Stanford University and the tests were made by Professor Lesley and reported early in 1923, copies of his report being also sent by Doctor Reed to the propeller section of McCook Field. These reports were stated by Professor Lesley to show the highest efficiencies yet recorded for the same pitch ratios.

Thus through Doctor Reed's research on forces and reactions at extremely high velocities, there has been developed a duralumin propeller excelling all other propellers in durability, efficiency, susceptibility to repair and therefore ultimate economy; successfully tried out on test stand and in service; and which bids fair to supplant other types within a reasonably short time.

Official photo U. S. Army Air Service

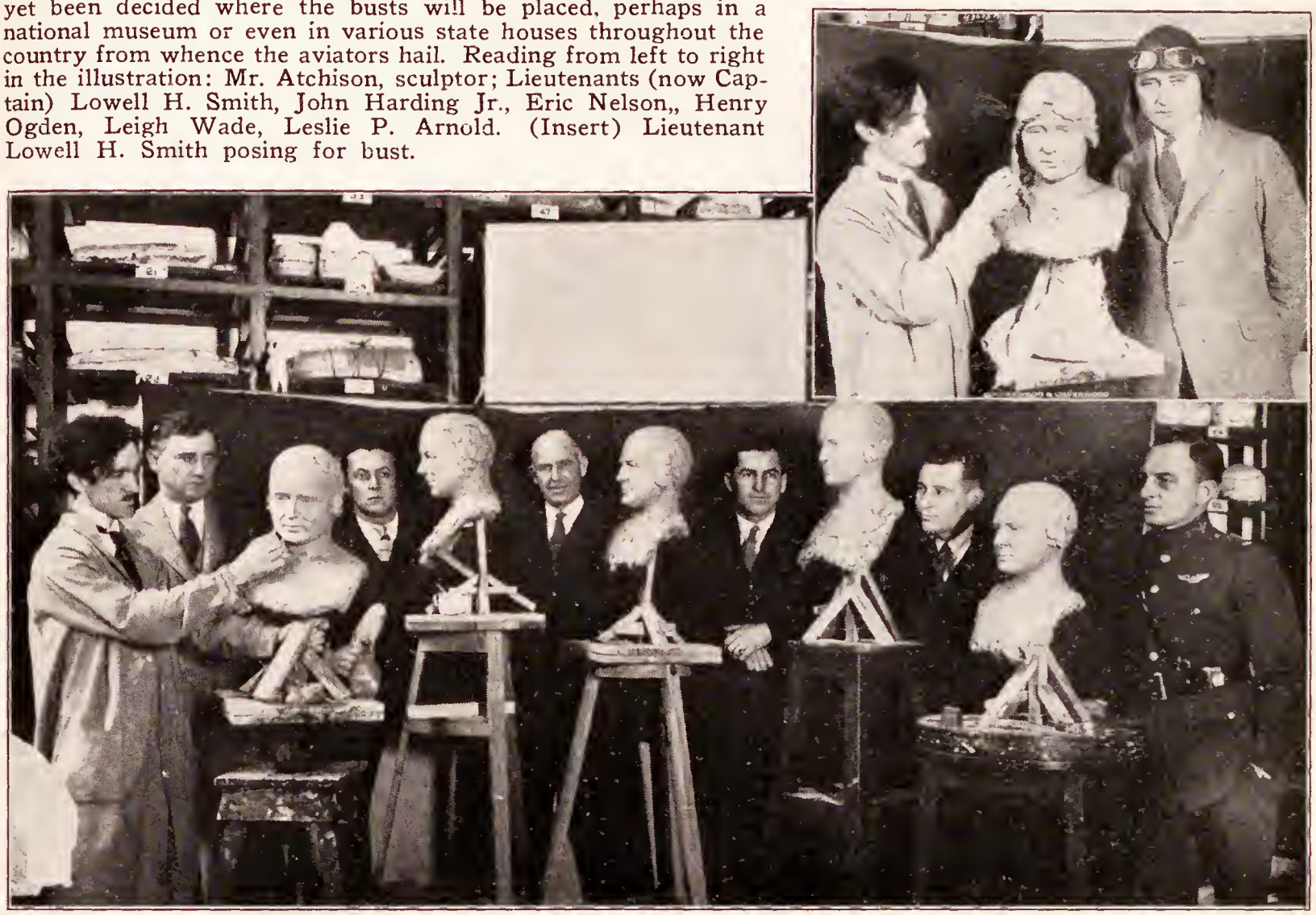
The CURTISS XO-1 OBSERVATION. Built around a Liberty 12-cylinder engine and said to have made a speed of 153 miles per hour in tests at McCook Field.

Official photo U. S. Army Air Service

The DOUGLAS XO-2 OBSERVATION. Built around a Liberty 12-cylinder engine and which has made remarkable performance tests at McCook Field. One can note the general characteristics of the famous Douglas World Cruiser in this design with cleaner lines throughout. It is reported that an order for fifty of these planes has been received by the Douglas Company just recently

World Flyers Pose for Noted Sculptor

Recently the World Flyers visited the National Museum and posed for Joseph Anthony Atchison, a promising young sculptor, who is executing individual busts of the Army flyers who circumnavigated the globe in airplanes of American design. It has not yet been decided where the busts will be placed, perhaps in a national museum or even in various state houses throughout the country from whence the aviators hail. Reading from left to right in the illustration: Mr. Atchison, sculptor; Lieutenants (now Captain) Lowell H. Smith, John Harding Jr., Eric Nelson,, Henry Ogden, Leigh Wade, Leslie P. Arnold. (Insert) Lieutenant Lowell H. Smith posing for bust.



Underwood & Underwood

The seers agree that mortal clay at best is weak indeed,
That he who fain would conquer worlds must seek a better half,
So gaze upon this spectacle, of jolly bachelors
Upsetting all the rules of fate and knocking custom cold
With such a crusade in the air as makes the planets rave
At impudence of Mother Earth, unknown in solar sphere
To Mars and Jupiter the Great, yet casts its posies sweet
Around its noble conquerors, and worships at their feet!

Ah! 'twere fitting circumstance to sing of noble sires
And carve in monumental stone this Herculean task
Of braving death a thousand times o'er lands of ice and snow,
Of dying every ruthless day, but coming back to life,
That the message of democracy from the good old U. S. A.
Should echo down the hills and vales wherever men may be,
And bring the peoples of the earth in neighborly accord
To goal of peace, good will—and marching ever Heavenward!

From—An Ode to the World Flyers.—By George M. Batty, Jr.

World Flyers Rewarded

On December 29, the Secretary of War approved the plan of the War Department to reward the World Flyers. As a result of this action Lieutenant Lowell H. Smith, commander of the Round-the-World Flight was advanced to the rank of Captain and placed 1,000 files forward on the promotion list of officers of this rank. First Lieutenants Eric Nelson and Leigh Wade together with Second Lieutenant Arnold, which latter officer was advanced from the rank of Sergeant during the period of the flight are advanced 500 files on the promotion list. Sergeant Henry Ogden, who held a reserve officer's commission as Second Lieutenant is appointed a lieutenant in the regular army, while Jack Harding Jr., a civilian who held a similar status in the reserve corps as Ogden will also be appointed a regular army officer. In addition to such recognition the flyers will receive distinguished service medals and may accept decorations from foreign governments. The promotion granted Smith is equal to thirteen years actual service in the line of Captains, while the advance of the other officers is equal to four years of service.

This promotion is said to be the greatest ever granted in peace times and carries in addition the provision whereby the men may retire from active service at their own request with the rank and pay allowance of the rank next higher than that held at the time of retirement.

WHO'S WHO IN AIR CIRCLES!

FRED L. McNALLY
Rand-McNally Company

Charting Invisible Airways

From an Interview With Fred L. McNally

"NO man can predict the tremendous influence which air transportation will have upon the commerce of the future, but I am convinced that the day is not far off when air routes will be as common as steamship lanes and railroad rights of way."

Fred L. McNally, of Rand-McNally and Company, leaned back in his swivel chair in his Chicago office, and waved an all-embracive hand toward a wall literally covered with maps—commercial maps, school maps, radio maps, auto-trail maps and just plain maps.

"And there," he continued, "are the means which are making navigation of the air possible and hurrying along the day when aerial transportation will be a matter of economic importance in America. It is the development of map-making which already has put aviation on a practical basis. The old explorers by sea and land made their charts as they went, venturing into strange seas and unknown lands. The explorer of the air, save in the uninhabited corners of the globe, is under no such handicap. Maps are provided for him—maps intended originally for other purposes but containing most of the information the flyer, whether in a plane or a dirigible, needs to follow his course.

"We have been filled with the vision of aviation for a good many years and we have been trying to put upon Rand-McNally maps all data which might be of value to the chap winging his way across the blue. We wanted to be pioneers in aiding the flying man with maps which meet his requirements and we believe we are succeeding. Perhaps there is no greater tribute to our efforts than the fact that the Army round-the-world airmen carried Rand-McNally maps to chart their course from Santa Monica to Seattle on the start of their globe-girdling flight, and used Rand-McNally maps in the last lap from Maine to California.

"And just a few months ago, when the Navy ventured ashore, and sent the dirigible Shenandoah on a 9,000-mile flight from Lakehurst, N. J., to Camp Lewis, near Seattle, the navigators had with them a complete set of Rand-McNally state maps and made effective use of them throughout. In the report made by Lieutenant Commander Lansdowne, of the Shenandoah, our maps are praised particularly for the lists of towns with populations on the margins—an example of a valuable contribution made to aerial navigation.

"To me, a good map is a work of art: to the chap up in the ether, whose very life depends upon the accuracy of his charts, a good map is a blessing. So much depends upon its accuracy, that the map-maker who would dare to permit an error in it would be morally responsible for any accident which might happen. The Rand-McNally watch-word in all the years it has been making maps is 'accuracy' and, that our reputation is established is proven by the Rand-McNally maps which go with Uncle Sam's flyers—Army or Navy—when sailing the air-lanes.

"My grandfather, Andrew McNally, started making maps the year after the great Chicago fire—back in 1872—and we, who have succeeded him, are striving, even as he did, to make each new map better than the one which has gone before.

"In the old days Rand-McNally maps showed, in the information they contained, appreciation of the problems of the railroad builders and later of the automobile tourists. Now we have a new kind of travel to provide for—the airplane and the dirigible.

"People who spend their days on the ground and their nights in a safe and comfortable bed, perhaps have slight appreciation of the importance of the aviator, of maps—particularly commercial maps with their wealth of information which Government maps do not give.

"We early found the demand for our commercial maps increasing in direct proportion with the interest in flying. Since the World War, with the development of the Post Air Service and commercial flying, we have been deluged with requests for maps which would contain every bit of information it was possible to show. The Army likewise is a firm believer in and a good patron of our maps. I do not think any aviator today takes the air for a protracted flight without Rand-McNally maps to supplement those which have been prepared by the Government. In fact, all of the flying fields have case after case of our maps available for immediate use.

AS to the nature of the maps in use for aviation, they vary from county maps to state maps. The wear and tear upon them is great, and seldom after a long flight, are they available for a second use. But, in many cases, they are proving of great value to air fields as adding additional information for future flights. The aviator, whenever possible, notes upon the maps any outstanding feature of the ground beneath, which he thinks will be of benefit to future flyers. When a long flight is contemplated, all of the existing data from past flights is placed upon the map. There was an interesting instance of this in the case of Lieutenant Nelson, one of the world flyers, who plotted upon a Rand-McNally map of California, the course he

would fly northward toward Seattle on the first leg of that famous flight.

"Aviation and map-making are sciences of today which are striding—or should I say, flying—side by side."

Mr. McNally's reference in his interview to his grandfather, recalls the fact that it was in 1872 that Andrew McNally introduced the new process of "relief line" engraving in the making of maps—a step not only of tremendous importance in the growth of the business, but one which revolutionized the methods of making maps and in many cases reduced their cost by more than half. In the fifty years of its existence Rand-McNally and Company has made maps and charts for nearly every government in the world.

Its publications are not confined to maps, but its fame rests chiefly upon that end of the business. The name has been widely heard in connection with maps, atlases and guide books, the "Commercial Atlas" being the oldest and best known work of its character published in the country. Other Rand-McNally products in these fields include maps of every part and political divisions of the world—political, physical, commercial, historical, educational and classical; map cases and appliances; modern, classical and Biblical atlases; guides to all countries, states, counties and cities; railroad and highway guides; cases for displaying railroad and steamship folders, and globes in many sizes.

PAUL W. LITCHFIELD
The Goodyear Tire & Rubber Co.

Paul W. Litchfield

Paul W. Litchfield, first vice-president of The Goodyear Tire & Rubber Company of Akron, Ohio, is also vice-president and general manager of The Goodyear-Zeppelin Corporation, the Goodyear subsidiary which has taken over Zeppelin rights for America.

Mr. Litchfield was born in Massachusetts and graduated from Massachusetts Institute of Technology in 1896, and joined the Goodyear Company in 1900 as production superintendent.

Goodyear's first automobile tire was built under his direction, and more than 60 million tires have been turned out under his supervision since—the largest tire production credited to any one man in the world.

Mr. Litchfield has been actively interested in aeronautics for a great many years, especially in the field of lighter-than-air, and the activities of his company made Akron the center of lighter-than-air construction in this country.

He has directed the construction of more than 500 aircraft of all description in the last twelve years—spherical balloons, kite balloons, observation balloons, non-rigid airships, semi-rigid airships—and built the gas bags for the Shenandoah, the first American rigid ship.

His company will build its 100th dirigible ship during the coming year, and also the "RS-I," America's first semi-rigid.

Goodyear officials closed an agreement last fall with the Zeppelin corporation to take over the Zeppelin rights for America through the formation of the Goodyear-Zeppelin Corporation.

DONALD DOUGLAS, Young designer of the famous Douglas World Cruisers and Douglas XO-2 Observation Plane.

BRIGADIER-GENERAL WILLIAM MITCHELL, who is a strong advocate for a separate Air Service.

A Feat of Daring

Air Service News Letter

DURING an aerial exhibition given at Nevada, Missouri, for the entertainment of the Governor of Missouri, there occurred an event which was not on the program and which, but for the skill and daring of Captain C. R. Wassall, 35th Division Air Squadron; 1st Lieut. Fred C. Nelson, U. S. Army Air Service, Instructor of Missouri National Guard Air Service; and Sergeant Jeddie E. Sharp, would have ended disastrously, as the life of Sergeant R. D. Douglass was in jeopardy.

The incident herein related occurred on July 24, last, on which date the Commanding Officer of the Missouri National Guard caused a General Order to be issued commending Captain Wassall and Lieutenant Nelson for their calmness and skill in handling their planes in such a manner as to enable a knife to be passed to Sergeant Douglass, with which the latter cut the rope which bound him, at a time when Captain Wassall was flying dangerously low over a lake; also Sergeant Sharp for his courage and coolness at the risk of his own life, in that although lacking any previous experience to qualify him he volunteered to ride on the top of the wing of Lieutenant Nelson's plane and standing thereon in high wind succeeded in placing the knife in the hand of Sergeant Douglass, whose swaying body threatened to sweep him from his insecure position.

Lieutenant Nelson's story of the incident was not received by Slipstream until just recently. It appears that through modesty he made no official mention of it until the Corps Area Commander, 7th Corps Area, on October 15, in transmitting to him a copy of the General Order previously referred to, together with commendatory remarks of intermediate commanders, called upon him for a full report on the matter.

We quote below Lieutenant Nelson's indorsement in reply thereto, as follows:

On July 24, 1924, while the undersigned was on duty as Air Serviee Instruetor, Missouri National Guard at Nevada, Missouri, several planes of the 35th Division Air Serviee engaged in an aerial exhibition for the entertainment of the Governor of Missouri.

The instruetor, not eonsulted in regard to the program and not aware that sueh a performanee was seheduled, was not present but was in the city of Nevada in eompany with the brigade adjutant.

One of the Guard planes pi'oted by Captain Wassall, had a rope tied to the landing gear. The other end of this rope was fastened seeurely about the waist and between the legs of Sergeant R. S. Douglass. When direetly over the parade ground at about 1.000 feet altitude Douglass elimbed from the rear eoekpit and walked out to the leading edge of the right wing to the wing tip in sueh a way that the rope hung clear between himself and the landing gear. Onee out on the wing tip he startled the speetators by purposely losing his hold on the wing and falling about twenty feet—the length of the rope.

He sat in the rope for a time until it stopped oseillating and then attempted to elimb the rope to the underearriage of the plane. In order to faci'itate this he had knotted the rope at intervals whieh he supposed he eould reach in elimbing hand over hand. But the distanee between knots was too great and after several exhausting efforts Douglass gave it up and sat in the end of the rope while Captain Wassall flew around the field to attraet the attention of other pilots on the ground.

Realizing that Sergeant Douglass would be killed when Captain Wassa.l's fuel was exhausted several pilots attempted a reseue but without any good result. As stated above, the undersigned was not on the reservation and it was neeessary to send a messenger to Nevada with the news of Douglass' predicament. Upon arriving at the flying fie'd it was learned that Captain Wassall had less than twenty minutes' fuel remaining. No one seemed to know how Douglass was fastened, and supposing that he was seated in a trapeze from whieh he eould leave at will, the instruetor deeided to pass him a paraehute. Lt. Albert Smith volunteered to stand on the wing tip with the paraehute in hand and in this manner it was proffered to Douglass, but he refused it, shaking his head and making signs to the effect that he wanted a knife with whieh to eut the rope. Smith had no knife. We were then some distanee from the flying field and there was little time remaining, so the instruetor, still unaware that Douglass was fast in the rope, deeided to put his wing abreast of the Sergeant's body and let him elimb aboard. But Douglass refused this also and as the p'ane eame to him pulled himself up and slid over the proffered wing.

In attempting this it was seen that he was seeurely tied. The only remaining means of reseue was to pass Douglass a knife in order that he might cut himself loose and drop into a nearby lake. Lieutenant Smith was landed in a field near the lake and taken to the lake in the brigade adjutant's ear prepared to assist Douglass when he shou'd drop into the water.

The undersigned returned to the flying field as quiekly as possible and again eal'ed for a volunteer to stand on the wing tip with half a dozen knives. Sgt. Jeddie Sharp responded and when the plane was next brought alongside Sergeant Douglass, Sharp not only plaeed the knife in Douglass' hand but closed his fingers over it to make certain that he would retain it. Douglass showed the knife to Captain Wassa'l who glided down over the lake into the wind as slowly as possible. Douglass headed himse'f in the d'reetion of flight and lay as horizontally as possible and when over the lake and about six feet above the water eut the rope. The undersigned fol'owed to the lake to be in a position to observe what took plaee. Douglass hit the water flat on his baek traveling head foremost, skipped onee like a flat roek and then sank and started swimming, his strength was nearly spent and he swam only a short distanee, but Smith reaehed him in time to take him in —despite the faet that the boat he started in sank to the bottom.

The reseue was not the result of the aetions of any one individual but the result of teamwork for which the personnel of the 35th Division Air Serviee is eommendab'e.

Captain Wassall's plane was equipped with a 150 h. p. motor and that of the instruetor was 400 h. p., whieh made it nearly twiee as fast. It was therefore neeessary for Captain Wassall to keep his p'ane perfeetly steady in order that the undersigned might stall alongside and be'ow in his propeller wash with the same speed as the slower plane. Again Captain Wassall showed exce'lent judgment in bringing his plane down over the lake at the proper altitude and without bumping Douglass against trees, fences and other obstaeles whieh wou'd have killed him. Sergeant Sharp's performanee on the wing tip was wonderful—almost ineredible in view of the faet that it was only his seeond flight in the air. Lieutenant Smith was "there like a duek" and seemed as mueh at home in the water. The performanee of the undersigned, however, was nothing more than eould be expeeted from any pilot of seven years' experienee in the Army Air Serviee.

—FRED C. NELSON, 1st Lieut. A. S.

Continued from page 26

to the lowest possible limit. Parasite is of course of prime importance in any airplane, for a light plane, however, its importance increases in direct proportions to the increase of power loading. It will probably be found impossible to decrease the parasite area beyond a limit of approximately 2 sq. ft. for a 500-pound plane. Naturally this will lead to a reduction in the high speed over that which would be expected reasoning from the Induced Power reduction alone. This is one of the penalties that must be paid for flight with low power, and should affect the general utility of these ships but little when considered in the light of their low first cost and upkeep. To draw a parallel from the automobile industry the most useful and widely sold car manufactured is capable of developing but less than one-half the speed cross country than some of the larger and more expensive automobiles. Its utility in congested traffic, however, compensates in a great measure for such lowered high speed. Likewise the Light Plane, due to the fact that it can get in and out of smaller areas and possibly paved roads, if necessary, closer in to the center of cities, may make up in the long run for some of the difference in maximum velocity.

LIGHT plane races with high speed as the only criterion have been somewhat criticized in this country as not furthering development along the proper lines. Such a thought is absolutely without foundations. High speed is the most important single item to be developed provided, however, that the power is not increased and that no sacrifice is made in utility.

An increased high speed (with same power) necessitates a reduction in parasite. Lowering weight and lowering parasite are the two most important problems confronting the light plane designer today. Provided, of course, that neither is done at the sacrifice of first cost, upkeep, or general utility. If the parasite and weight be lowered sufficiently, rate of climb, ceiling, and time to altitude may be increased at will by decreasing the span loading. The design which makes the best high speed may be revised slightly if it be lacking in any of the above particulars and made to out-perform any other design of same power and weight.

Returning to formula (5) it will be seen that no mention has been made of two quantities hitherto thought to be of prime importance in airplane design, namely wing loading (pounds per sq. ft. of area) and aspect ratio (ratio of span to chord of wing). If the span be constant, wing loading (or wing area) has but little effect upon the curve of Power Required. Its main influence lies in the fact that it controls the wing Parasite Power, formula (2), and also the minimum speed at which level flight may be maintained. It is naturally assumed in application of formula (5) that the wing area is sufficient to maintain level flight at any velocity substituted into the equation. Wing area controls the lower limit of velocity (constant span and airfoil), and to a slight degree the parasite. Aspect Ratio on the other hand is a perfectly useless term. Span and area tell the whole story. This is true whether a monoplane or multiplane be under consideration.

A little thought will show wherein lies the fallacy of the belief that rate of climb and ceiling vary as the wing area.

When these relationships were first worked out showing such dependence of performance upon wing area the investigators overlooked the fact that since they were keeping the **Aspect Ratio Constant** in their calculations they were varying the **span** as well as the **wing loading.** The effect obtained was due to the variation in **span** so produced and not to the **wing loading.** This is an example of reasoning from an experimental rather than a theoretical basis. The effect was attributed to a cause which in reality acts just the opposite than generally was supposed. **With constant span an increase of wing area will decrease ceiling, rate of climb and high speed through the increase of parasite.** However, at the same time a lower landing speed will also be obtained.

From Theorem I above defining the speed of minimum power it may be shown that

if $V_{M.P}$ = Speed of minimum power.

$$V_{M.P} = 10.64 \sqrt[4]{\frac{W^2}{S^2 A_P}} \text{ at the ground.} \qquad (6)$$

The theoretical low speed of the airplane should not be greater than the value given by equation (6) in order that the maximum effect may be realized from the given span loading.

For the 500-pound light plane investigated above with a value of A_P = 1 sq. ft. $V_{M.P.}$ works out to be 47.7 miles per hour. If the airplane, however, has an A_P of 2 square feet $V_{M.P.}$ becomes 40.1 miles per hour. The wing area should be such that in either case flight might be maintained at the speeds given, or preferably slightly less. Therefore wing area enters into consideration but entirely in a secondary manner.

If $K_{y\,max}$ = Maximum lift coefficient of airfoil used in lbs. per sq. ft. miles per hr. units.

$$\text{Then } A_W = \frac{W}{K_{y\,max}\ (V_{min})^2} \qquad (7)$$

Equation (7) determines the wing area necessary for a required low speed.

Table II lists some of the best American airfoils, giving the value of the maximum lift coefficient as well as the minimum profit drag of the sections. Since the low speed as given by formula (6) is more or less determined by this or other considerations $K_{y\,max}$ should be as large as possible in order that a smaller area may be used with corresponding reductions in wing weight. Similarly K, the profit drag coefficient should be as small as possible in order that the wing Parasite Power, $P_{W.P.}$ (see formula 2) should be low. Therefore the ratio of $K_{y\,max}$ to minimum profil drag coefficient, or should be a very good criterion for the choice of an airfoil, not considering structural requirements or stability. This ratio also enters into Table II for ready comparison.

Airfoil	Ky max	Kmin	Ky max / Kmin	Remarks
R.A.F. 15	.0026	.000025	104	Thin—very good
U.S.A. 27	.00344	.0000345	99.8	Medium Thick
Gott. 387	.00366	.000041	89.3	Medium Thick
Gott. 430	.00328	.000033	102.5	Medium Thick
Gott. 436	.00307	.0000313	98	Medium Thick
U.S.A. 35 B	.00333	.0000325	102.5	Medium Thick
U.S.A. 35 A	.00376	.000044	85.5	Very Thick
Clark W	.00291	.0000294	99	Medium Thick
Clark X	.00289	.0000289	99.8	Medium Thick
Clark Y	.00318	.0000269	118.2	Medium Thick—good
Clark Z	.00321	.000030	107.4	Medium Thick—good
U.S.A. 16	.00274	.0000229	119.5	Thin—good
Curtiss C-62	.00233	.000022	106.0	Thin—Racing section
U.S.A. 35	.00383	.0000334	114.5	Tapered—cantilever
U.S.A. 45	.00331	.0000276	120	Tapered—cantilever
Sloane 105	.00238	.0000232	102.5	Very thin

POWER required for flight at any velocity has been investigated with special reference to the light plane. The power available from the motor-propeller group has not as yet been touched upon. The motor itself is generally determined by considerations of price, availability or race rules. The design of the propeller however may have a marked influence upon the general performance through its control to a certain measure of the Power Available, P_a. The Prandtl theory has been extended to apply to propeller design and suggests some very useful theorems especially pertaining to Light Plane propellers.

In the preceding discussions it has been shown that the ratio $\frac{W}{S}$ should be very small, similarly it may be demonstrated in case of the propeller that the thrust over the diameter should also be as small as possible. Mr. Max M. Munk in N. A. C. A. Technical Note No. 94 has worked out a formula for propeller diameter, D based upon this theory.

Let P_M = Power of motor at

N = Revolutions per minute of propeller shaft.

V_D = Velocity in miles per hour at which the propeller efficiency is desired to be a maximum, normally the designed high speed of the plane.

D = Propeller diameter in feet.

$$\text{Then } D = 564 \sqrt[3]{\frac{P_M}{NVD}} \qquad (8)$$

If equation (8) gives a diameter such that .0524DN exceeds 820 ft. per sec. the diameter will have to be reduced until that limit is not exceeded. This is due to fact that as the speed of the propeller tips approaches the velocity of sound the compressibility of the air becomes a noticeable factor and lowers the efficiency very rapidly. Equation (8) will give diameters in excess of present practice, which is based upon the assumptions that ½ the diameter divided by the maximum blade width shall be approximately 6. That is with the diameter above computed the maximum blade width will be smaller than present practice would allow. Due to the fact that the weight and thrust are low the stresses imposed upon the light plane propeller permit this increased ratio of diameter to blade width. The reasoning is similar to that which allows a larger span in proportion to weight for a light plane than for the larger type.

The propeller used on the D-J-1 was 58 inches in diameter and but 3½ in. maximum width. No trouble whatever was experienced. Weeds, grass, etc., had no appreciable effect except to wear the fabric tips.

The influence of increasing the diameter is two-fold. The slipstream velocity is less and therefore the energy losses are also decreased with a consequent increase in propeller efficiency. The velocity of the slipstream being less and distributed further away from the fuselage causes less interference between the body and propeller. Both of these considerations make for better all around performance.

A numerical example will serve to show more clearly the differences between ordinary practice and diameters given by equation (8).

V_D = 95 miles per hour.
N = 3000 revolutions per minute.
P_M = 25 H.P.

$$D = 564 \sqrt[3]{\frac{P_M}{NVD}}$$

D = 5.5 feet = 66 inches.

A formula derived by H. C. Watts for propellers of Aspect Ratio 6 give

D = 4 84 feet = 58 inches.

If the maximum blade width in the latter case works out to be 29/6 = 4.84 in., the width using a 66-inch diameter propeller is approximately 4 inches or ⅛ of the blade radius instead of 1/6.

No attempt has been made to propose a method of performance calculation or propeller design. The main intention in mind has been to bring out a few very simple rules important in the design of light planes. These ideas are summarized below.

Rule I. Make the ratio of span to weight as small as possible compatible with structural and housing conditions.

Rule II. Build as light as possible.

Rule III. Reduce Parasite to the absolute limit, even at the sacrifice of weight.

Rule IV. Use large diameter, narrow blade propellers.

The next sections will show by means of a definite numerical example how the different performance characteristics are affected by the variations in the dimensions of a light plane.

THE WEST SIDE BUILDING AND LOAN ASSOCIATION AIDED WRIGHT BROTHERS

Forty years of faithful and conservative operation now marks The West Side Building and Loan Association as one of the most popular institutions of the Miami Valley.

This concern is located within a stone's throw of the actual birthplace of the airplane. Just a half block away still stands the little shop room where more than a score of years ago the Wright Boys, Orville and Wilbur built bicycles and tinkered with their crude flying machine. Orville, the surviving brother still maintains an unpretentious experimental laboratory near the orignal shop and can be found there most any day engaged in some mechanical problem.

It has been a popular contention that Dayton did the least toward assisting the Wright Brothers in their early struggles for financial aid to further their experiments. This is not altogether true for the Wright Boys were not without loyal friends in Dayton.

One of the most pleasant items on the records of The West Side Building and Loan Association is in connection with material assistance extended the Wright Boys during a crucible period of their early career.

The West Side Building and Loan Association is still a friend of aviation or of any cause which has the merit of worthiness, and of some good to the community.

Eliminating Fire Hazard

ONE of the more important problems in aviation that is now gaining concerted attention is the question of eliminating fire hazard. It should not be construed of course, that there is any particular danger nowadays in planes catching on fire during normal flight. Improvements in the more recent designs have practically eliminated all ordinary chances of fire from the exhaust, or other sources igniting the ship or reaching the fuel supply. The present question is centered on the possible prevention of fire in crashes. A great number of plane crashes have been accompanied by the explosion of the gas tanks and total consumption of the wreck by fire. We will recall the recent disastrous wreck of the passenger plane on the Paris-London airline. The ship crashed from a low altitude shortly after leaving Croydon, near London, and immediately burst into flames as it struck the ground, with the result that eight people perished. Had the fire not broken out, there is a chance that some of the crash victims might have survived.

To study the cause of these fires unique tests have lately been conducted at Wilbur Wright Field, Dayton, Ohio, with several condemned ships figuring in actual crashes. A long concrete incline of one hundred yard length is installed at the field after the fashion of the automobile bumper testing incline at several Underwriting Laboratories of this country. The ships are "tied down" at the top of this incline and the motor opened wide. As soon as the maximum speed is secured the plane is turned loose on the incline. Speeding forward at a rate corresponding to the rate of descent in a crash, the plane crashes against a cement wall at the foot of the incline. Here cameras are trained upon the scene of impact and the pictures studied with a view to discovering just what happens during the crash to cause the fire.

In this connection we learn that a French aviator, M. Bechard, has recently perfected a new and effective fire extinguisher for airplanes. It is said the inventor has several times taken a plane into the air, deliberately set it on fire and on every occasion extinguished the blaze in a few moments. Briefly, it is said, the system consists in an arrangement, whereby, as soon as the temperature in the engine housing exceeds a certain figure, the chemical substance employed is automatically sprayed by rotating nozzles, over a considerable area, and the fire has on every occasion, when the extinguisher has been tested, been put out before it had time to spread to the rest of the machine. Of course this type of fire prevention would not be effective in a crash but it is an interesting feature toward the absolute elimination of fire risk while in flight.

Helium

A Research Narrative

By R. H. Moore, Bureau of Mines

HELIUM is in the air in the proportion of one part in 185,000 by volume; neon, one part in 60 000; argon, one part in 104; krypton, one part in 19 million, and xenon, one part in 190 million. These gases are all inert, do not react with other elements, and for this reason probably more than for any other, they have excited great interest among chemists. Next to hydrogen, helium is the lightest gas known, having twice the density of hydrogen.

Helium has been liquefied by Professor Onnes in Leyden. The liquid boils at −268.75° C, which is very close to absolute zero, that −273° C. Onnes is the only one who has liquefied helium, and he used the small amount of liquid obtained to determine some of the properties of matter at this extremely low temperature. What has been done is significant enough to make it very desirable to have liquid helium in quantity so that further experimental work along this line may be carried out.

Helium is found in the gases of many mineral springs. It is also found in natural gas in a large number of localities in the United States, particularly in Texas, Oklahoma, Kansas and Ohio. About four hundred million cubic feet of helium is going to waste each year from this source alone.

Since helium is not inflammable and has 92 per cent. of the lifting power of hydrogen, during the war, it became of great military value. The plan was to substitute helium for hydrogen in balloons and dirigibles, and thus make it impossible to bring these vessels to earth by means of incendiary bullets. Such a change would make tremendous progress in aeronautics, for both commercial and war purposes.

With this object in view, the U. S. Government has experimented on the extraction of helium from natural gas in Texas, and during the war three experimental plants were built and operated. At present one of these experimental plants is still being operated and a large production plant has been constructed at Fort Worth. It is hoped that the Government will support these plants on account of the fact that the United States is the only country in the world at the present time which has sufficient helium in its natural gas for war and commercial purposes.

The origin of helium in natural gas is uncertain. During radioactive changes, helium is thrown off in the form of the alpha particle, which is a helium atom with two positive charges. However, we are not acquainted with sufficient supplies of uranium or thorium ores to account for the large volumes of helium present in natural gas in this country.

If the helium does not come from radioactive changes, it might have come from the sun, if the earth was really thrown off from the sun. The chromosphere, or surrounding envelope of the sun, consists of incandescent hydrogen and helium. It is possible that the viscous mass of the earth in passing through the sun's atmosphere picked up sufficient gas to account for the helium now found below the earth's crust.

The price of helium before the war was approximately $2,000 a cubic foot. It is believed that in the new plant at Fort Worth helium may be produced for a little less than 6 cents a cubic foot.

Janssen, during a solar eclipse in 1868, detected new lines in the spectrum of the sun's atmosphere, but did not assign them to a new element. Sir J. Norman Lockyer also observed these lines the same year and suggested the name "Helium" (sun element). Sir William Ramsay, in 1895, first identified helium on the earth as the principal constituent of the gaseous mixture given off on heating cleveite, a mineral found in Norway. Helium was found later in several other minerals and in the earth's atmosphere. It has so far resisted all attempts to cause it to combine with other elements. Helium is one of the products formed in radioactive changes. Onnes liquefied helium in 1908 and found it, next to liquid hydrogen, the lightest liquid known, specific gravity 0.122, at approximately 4 degrees absolute, or 269 degrees below zero Centigrade.

Editor's Note.—We would like to call attention to the fact that a number of illustrations appearing in this issue of *Slipstream* in connection with the story of Wright Brothers' Early Developments were furnished through the courtesy of *U. S. Air Services* magazine. This publication is issued monthly in the interest of aviation and is edited by Earl Findley, a former captain of the Air Service.

The *U S. Air Services* is one of the very best aeronautical publications to be found on the market and the editor of *Slipstream* takes pleasure in indorsing it to the readers of this magazine.

Continued from page 20

most nearly fulfills these first two requirements of of any means we have. Whether or not it fulfills the last is a matter too broad for discussion here.

THESE then are the ultimate objects of this new field for which its personnel, either consciously or unconsciously, are striving. Wood and steel, fabric and wire are necessary but incidental media. What do these objects imply for the engineer entering aeronautics?

We read recently a rather interesting statement by a gentleman prominent in the field of aesthetics that "The natural sciences are well in their places, but discoveries such as aviation (aviation is not, by the way, a discovery) are infinitely less important to the race than the smallest addition to the philosophy of the spirit." In other words, the ratio of importance is an infinitesimal of the second order. Certainly this exaggeration is of value in drawing the attention of the technical man to the fact that there is a broader field than his own particular specialty and that, unless he obtains an enlarged vision, he will lose out in the most important leadership of his generation.

For one thing, although the natural scientist now holds the popular interest and attention on account of recent spectacular achievements, he will be hard pressed by the psychologist, sociologist and educator. Indeed, the element of truth in the above quoted statement and the thought which has been so much stressed by modern thinkers is that, for the moment, we could exist without any further material improvements but are in great need of development of the human sciences and the arts. The least the engineer can do is be prepared to appreciate and help utilize the developments of the rival field.

But still more important is the fact that the engineer should prepare to aid in the application of all these theoretical fields in government and education; to contribute not only the particular technical elements which he has evolved but also the attitude of mind which he has developed in the process. This means the participation in public affairs by engineers.

Since these problems in public life are the most general problems which face men, and since the intimacy of contact of races and nations of which we have spoken is going to make these problems of world scope, action will certainly be along the lines suggested by the world's broadest thinkers. Today the names of Newton, Einstein, Watts, Marconi, Wright, Pasteur, Freude, and others who have produced great advances in our knowledge of man and his world, are on men's tongues; tomorrow, if the intellectual generalization keeps up its present pace, they will be Jesus, Buddha, Bacon, Wells, Robinson and Korzybski, and others who have managed to see the forest in spite of the trees. It is unthinkable that the aeronautical engineer, who will be responsible for one of the important aids to this intellectual progress, should fail to understand and participate in its application.

In the meantime the local problem is as fascinating as it is important. Its opportunities to do difficult engineering feats, to organize a new and romantic branch of travel, to prepare to secure the momentary rewards of a future production are increasing every day. Pioneering, it is true, at times involves big risk of reputation, money and even life, yet its rewards of accomplishment are usually a sufficient compensation.

A "Cow-ardly" Trick

"Everyone to his own taste," as the old lady said when she kissed the cow—and by that same token there is no accounting for the tastes of cows—at least Fort Worth cows.

The Officer in Charge of Flying at Brooks' Field, San Antonio, Texas, turns in the following telegram from Lieut. Bob Wimsatt:

"Delayed, due to cow eating wing. Home tomorrow."

And so it turned out, for when the lieutenant got home the next day he reported that some unprincipled bovine with a low sense of humor and depraved appetite had eaten large hunks out of the lower wing panels and stabilizer. He showed the homemade patches, too.

A GREATER WRIGHT VIEW HEIGHTS

The International Development Company of Dayton Acquires a Large Tract of Land Adjacent to the New Government Flying Field.

The International Development Company one of Dayton's most reliable realty concerns which has been signally successful in developing realty in the new aviation district has recently secured an additional tract of land adjoining their original holdings which is known as Wright View Heights. Their well merited success in disposing of all the sites comprising the first section of Wright View Heights led to negotiations for securing a large adjacent tract of land known as the old Stewart Homestead which comprises 91 acres and is located directly opposite the original plat of Wright View Heights on the Yellow Springs Pike to the Funderburg Road.

The deal was made through Earl Burroughs of New Osborn, while Attorney Morris D. Rice of the same place represented the International Development Company. The new addition to Wright View Heights is one of the most desirable pieces of property in the aviation district lying perfectly level and containing a fine grove of trees and the company will make immediate preparations to develop the tract for homesite purposes.

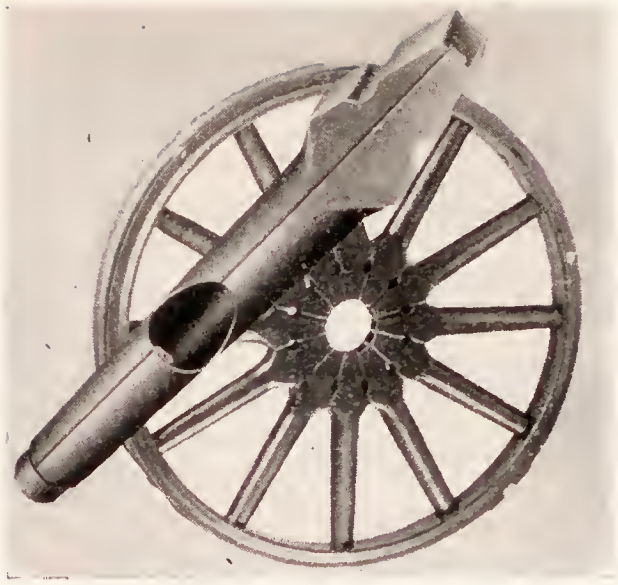
The vicinity of the New Government Flying Field promises to become one of the most active sections adjacent to Dayton with the advent of spring. With the assurance of the initial appropriation of $500,000 by the Government for the foundation work on the new field work will be inaugurated there very shortly and this will be supplemented by activities of the realty development companies who have interests in that section. Add to this the continued development at New Osborn, where a modern American community is developing with rapid strides due to the progressive spirit of its leading citizens among whom Earl Burroughs and Morris D. Rice may be specifically mentioned for their unremitting labors in the upbuilding of a newer and better Osborn.

"The Tragedy of Selfridge Field"

Wm. A. Mara, writing in *The Detroiter*, official publication of the Detroit Board of Commerce, points out a graphic fact as to the state of affairs in our Air Defense. We quote the paragraph which furnished as an introduction to a strong plea for Selfridge Field, which it seems is going to ruin through lack of Government appropriation.

"I stood in the operation's office at Selfridge Field a few days ago while members of the First Pursuit Group climbed into their heavy flying togs and made ready for their daily trip into the frigid upper air. An order was given, the flyers walked onto the field, parachutes were strapped on, and they climbed into their powerful little fighting ships which were standing on the 'line' with motors roaring."

"Then with a rush they took the air. Back and forth across the field they swept. The motors whined as they zoomed in response to a signal from the flight leader. Superb flyers—all of them. It was a brave picture they made, and yet a pathetic one, for the thirteen men who were flying that day constitute America's first line of defense in time of war. Those thirteen men, plus two others, comprise the First Pursuit Group—America's hope of peace. A handful of brave men who may be called upon to protect a nation of millions . . . ."



A New Wheel For Automobiles
Looks Like Wood But Made of Steel

For a year or more, it has been known that a new type of automobile wheel was being developed by The Dayton Wire Wheel Company, but just what this new wheel was to be was a mystery until recently.

After months of severe testing over all kinds of roads and under all sorts of conditions, The Dayton Wire Wheel Company is now announcing to the trade and to the car owner, the Dayton Steel Spoke Wheel pictured here.

Identical in appearance with the artillery type wood wheel, and made for either standard or balloon tire equipment, this steel spoke wheel readily meets the demand for both new equipment and replacement business.

The wheel is made of twelve spoke units, each spoke formed of sheet steel over special dies, giving it the necessary mitre at the hub end and a gradual taper in the barrel toward the felloe end. The mitre is so accurate that, when placed together, the twelve spokes form a solid arch at the hub, giving utmost strength at that point.

The accompanying cut, showing a sectional view of the fabricated steel spoke, gives a very clear idea of its light weight and sturdy construction. Notice the double folded seam extending throughout its entire length, thereby giving the spoke the strength of four thicknesses of metal. This seam is neither brazed nor welded, nor is there any brazing or welding at either hub or felloe ends. This method of construction prevents the possibility of crystallization which would occur at brazed or welded points. Another important point is that the all-steel construction of the wheel permits the use of a baked enamel finish equal to that found on the best car bodies.

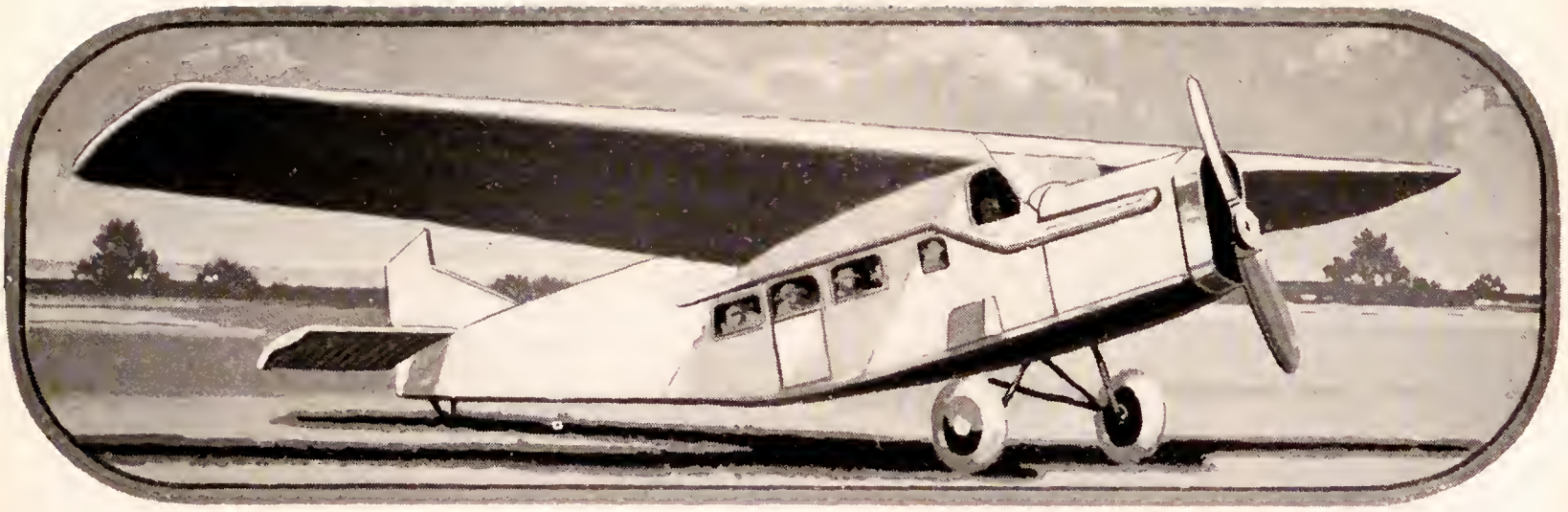
Unaffected by climatic conditions, this wheel will neither shrink nor warp. The spokes are so tightly forced into place that there is no chance for any part of the wheel to become loose or rattle; neither is there any rumble or roar, even when driven at high speed.

While it is expected that this new steel spoke wheel will find immediate acceptance, both as factory and replacement equipment, this fact will in no way affect the continued production of Dayton Wire Wheels.

Orville Wright Honored

Orville Wright, of Dayton, surviving member of the famous Wright Brothers, who accomplished the first airplane flight twenty-one years ago was recently named vice-president in the movement which will erect a $5,000,000 museum in Washington, D. C., honoring pioneers of American industry.

The museum which will be one of the finest edifices in the national capitol will contain a Hall of Fame in which will be enshrined the Wright Brothers, of Dayton, Charles P. Steinmetz, Alexander Graham Bell, Thomas Edison, Eli Whitney, Capt. John Ericsson, Robert Fulton and others.



All Planes Reported "On Time"

FLYER	EN ROUTE	DUE	WILL ARRIVE	WILL DEPART
EAGLE LIMITED	FRISCO - NEW YORK	10.30 P.M.	10.30 P.M.	10.45 P.M.
EAGLE LIMITED	NEW YORK - FRISCO	7.10 A.M.	7.10 A.M.	7.30 A.M.
THE NIGHT HAWK	DENVER - CLEVELAND	12.01 A.M.	12.01 A.M.	12.30 A.M.
THE NIGHT HAWK	CLEVELAND - DENVER	11.05 P.M.	11.05 P.M.	11.25 P.M.
THE FALCON	CHICAGO - NEW ORLEANS			8.00 P.M.
THE FALCON	NEW ORLEANS - CHICAGO	10.30 A.M.	10.30 A.M.	

THIS imaginary bulletin board of today is destined to become a reality of tomorrow. Last year's non-stop flight from coast to coast and the successful trial trips of airmail pilots between New York and California presage the daily flight of mail and passenger planes on regular schedules between many of the larger cities.

Passenger airplanes flying over Lake Erie between Cleveland and Detroit have established an almost perfect record. They have carried thousands of passengers without mishap and on scheduled time. Commercial aviation is unquestionably destined to play a great part in the affairs of this country

To insure safety and to maintain schedules uniform high quality lubricating oils and gasoline are essential. The Standard Oil Company [Indiana] having long since recognized this fact, set its technical staff to work to develop the oils and gasoline which would best fill the demands of aviation. Their fund of experience in refining and the vast resources of the company were brought to bear on the problem, with the result that Stanolind and Superla Aero Oils and Stanolind Aviation Gasoline were developed, produced, and are now to be had on every flying field in the middle west, where their uniformity, efficiency and absolute dependability are recognized by all flyers.

Our big new 48-page Aviation book contains data of great value to every airman. It gives you charts of flying courses, landing fields, comparative figures on different makes and models of aircraft—much of which is compiled here for the first time. Every flier may have a copy on request.

STANDARD OIL COMPANY

(INDIANA)

910 S. Michigan Avenue **CHICAGO, ILLINOIS**

Lieutenant John A. Macready—U. S. Army Air Service pilot ready to take off in the original Wright Brothers flying machine at the International Air Race Meet, Dayton, Ohio, October 4, 1924.

Are You Keeping Pace With Aviation ?

How many people, had they known ten years ago what they know today in the development of the Automobile, could have made an easy fortune.

How many village blacksmiths kept pounding away while the fellow next door sensing the change of affairs tacked up the sign "Garage" on his woodhouse and built up a thriving business almost over night.

Aviation is now in its infancy—It is passing an epochal crisis toward the great future it must ultimately attain.

Again we broach the question: Are you keeping pace with Aviation Development ?

Slipstream Monthly—The "Ace" among Aeronautical magazines is the one medium for the sensible fellow who wants to keep in touch with the real important things in Aviation circles

Slipstream is well illustrated and written in readable style.

SUBSCRIPTION BLANK

Slipstream Publishing Company.
401 Beckel Bldg., Dayton, Ohio.

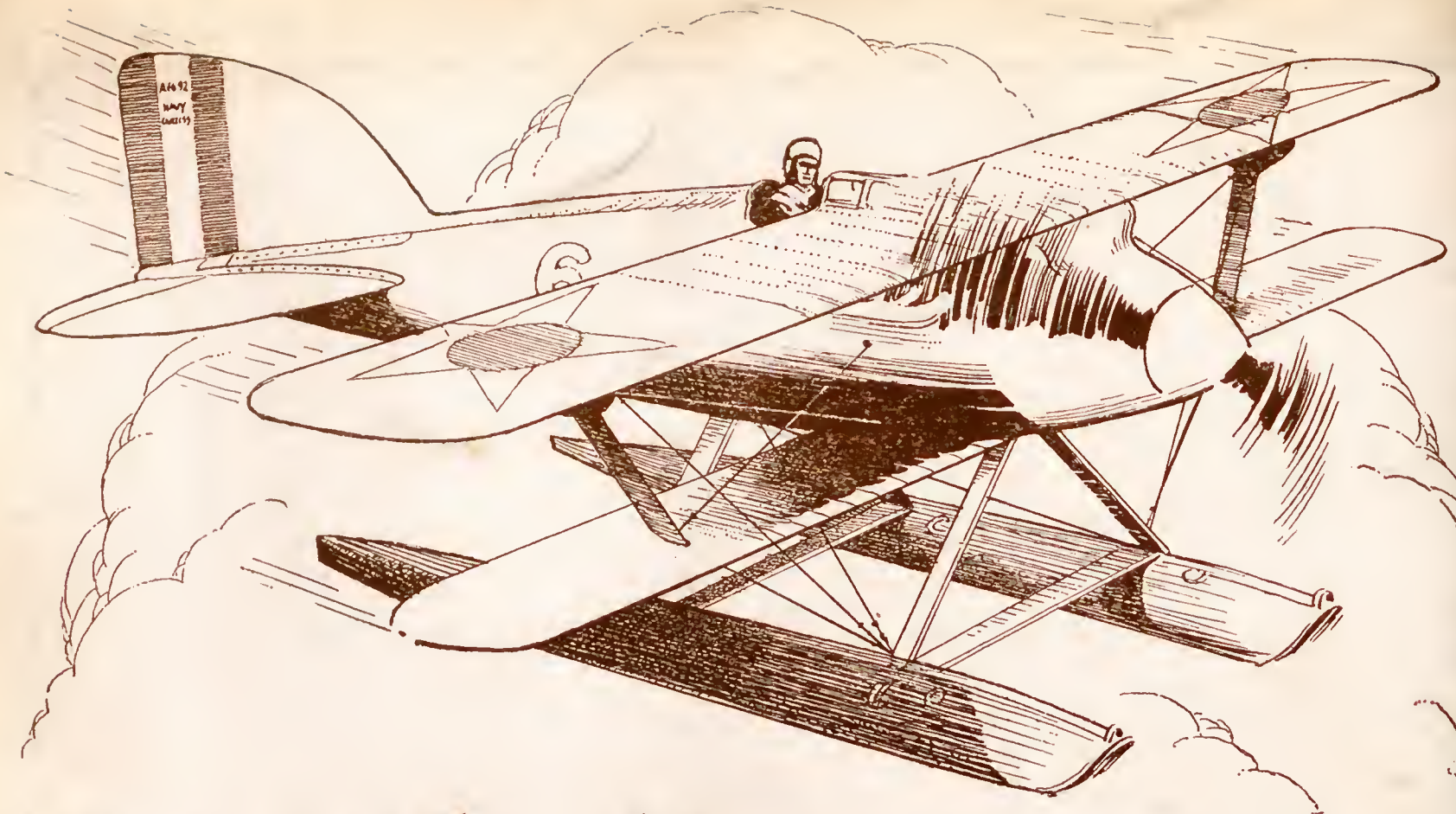
Gentlemen:

Please enclosed find (Draft) (Check) Money Order) to the amount of two dollars ($2.00) which entitles me to one yearly subscription to the Slipstream monthly

beginning with the.....issue.

Name.....Street and No.....

Town.....State.....



Over Land and Sea Valspar Wins!

TWO hundred twenty-seven and a half miles per hour! That's the remarkable speed made by the Navy-Curtiss Racer, winner of the Pulitzer Trophy of 1923. This machine, formerly a land plane, was re-designed by the Curtiss Aeroplane Motor Corps, especially to defend the Schneider Cup, brought to this country last year.

On a trial flight, Lieut. Rittenhouse flew this re-modeled plane at 227.5. m.p.h. This adds another thirty miles to the high speed seaplane record and sets up a new world's record to shoot at.

In reconstructing R2C-2, the Curtiss engineers availed themselves of the highest skill and finest materials. It goes without saying, therefore, that wherever there was a surface to be varnished, Valspar was used.

Waterproof, elastic and tough, Valspar never fails to give thorough protection from vibration and weather, oil, gasoline and grease. No wonder Valspar is everywhere recognized as the ideal airplane varnish.

Below: The Curtiss Navy Racer, after being re-designed by the Curtiss Aeroplane Motor Corps.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

VALENTINE & COMPANY

Largest Manufacturers of High-Grade Varnishes in the World

ESTABLISHED 1832

New York Chicago Boston Toronto
London Paris Amsterdam

W. P. FULLER & CO., Agents for Pacific Coast

SLIPSTREAM

February
1925

An
Aviation Monthly

Published in
DAYTON, OHIO
"Center of Aviation"

HASENSTAB STUDIO
DAYTON, OHIO

$2.00 PER YEAR

25¢ PER COPY

The New Orleans Air Line Fleet is Valsparred, of course!

THE New Orleans Air Line operates a fleet of five hydroplanes—for carrying United States Mail, for Passenger Service and for Aerial Photography. All their ships are Valsparred because, as Mr. Arthur E. Cambas, General Manager of the line, states—

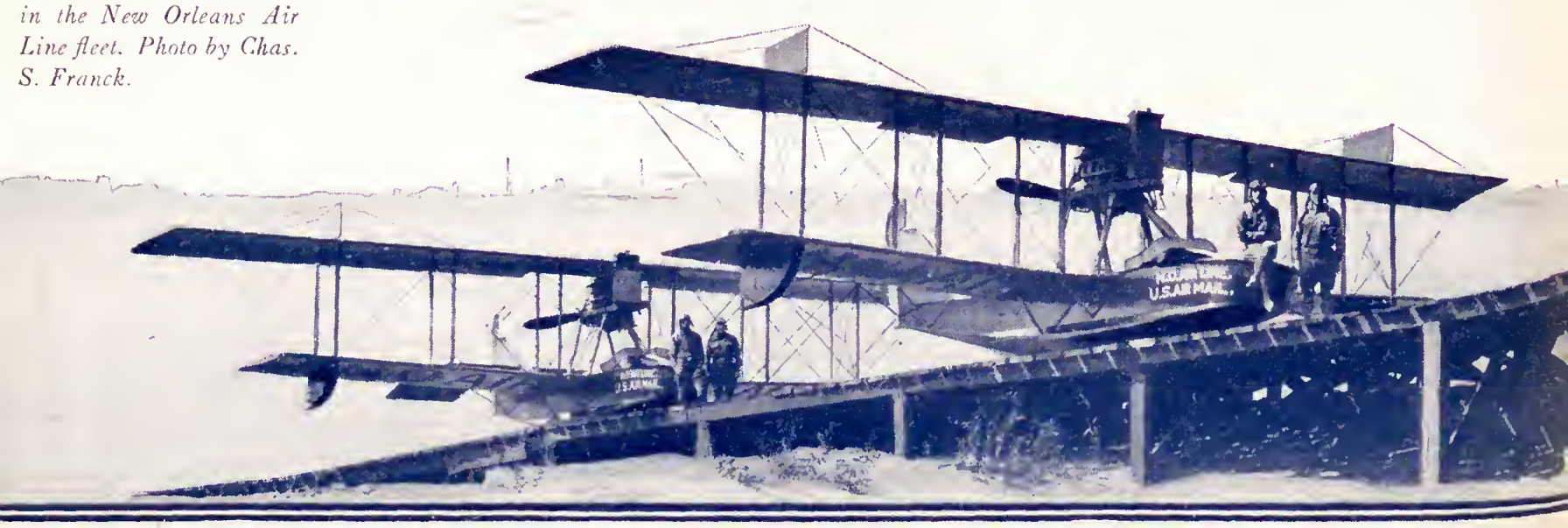
"My experience in Aviation has taught me always to use the best grade of materials obtainable, as the first cost of good materials is the last.

"In comparing the different grades of varnishes, we are able, through experience, to recommend Valspar highly, not only for its flash and brilliancy, but for its durability and stability as well. Other varnishes lose their lustre when coming into contact with the sandy waters of the Mississippi River, while Valspar is the only varnish that retains its gloss under similar circumstances.

"I cannot too highly recommend Valspar and you may be assured of our continued patronage in the future."

New Orleans Air Line's appreciation of Valspar is shared by leading designers, builders and operators of aircraft everywhere. They all agree that Valspar is the *ideal* varnish.

Below: Two of the planes in the New Orleans Air Line fleet. Photo by Chas. S. Franck.



Navy Wright Fighter F-2-W
Made by
Wright Aeronautical Corp.

Faster than the fleetest bird--
Swifter than the wind!

This picture shows the giant and the pigmy of airplane wheels. As shown on the plane above, all airplane wheels are "streamlined" with canvas liners to cut down wind resistance--hence the disc appearance.

Neither the flight of a carrier pigeon nor the speed of a gale can equal the travel pace of this Navy Wright Fighter. With a speed of 230 miles per hour it can go a long way from home and yet return the same day.

Such speed is essential in the airplane of today, yet safety in landing is also an important factor. It is there that Dayton Wire Wheels are helping plane manufacturers to achieve the unusual in the construction of their craft.

For years we have been co-operating with the officials of McCook Field and other aviation fields, in the development of wheels best suited to their particular needs. As a result of this work, Dayton Wire Wheels are known to hundreds of the world's best aviators who are enthusiastic over Dayton Wire Wheel performance. Write us for folder "K."

The Dayton Wire Wheel Company
Dayton, Ohio

Manufacturers of Wheels

"For the Man Who Drives or the Man Who Flies"

Dayton Wire Wheels
QUICK DETACHABLE

Slipstream

SLIPSTREAM—The stream of air driven aft by the propeller.

VOL. 6 FEBRUARY, 1925 No. 2

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879.

SUBSCRIPTION RATES:

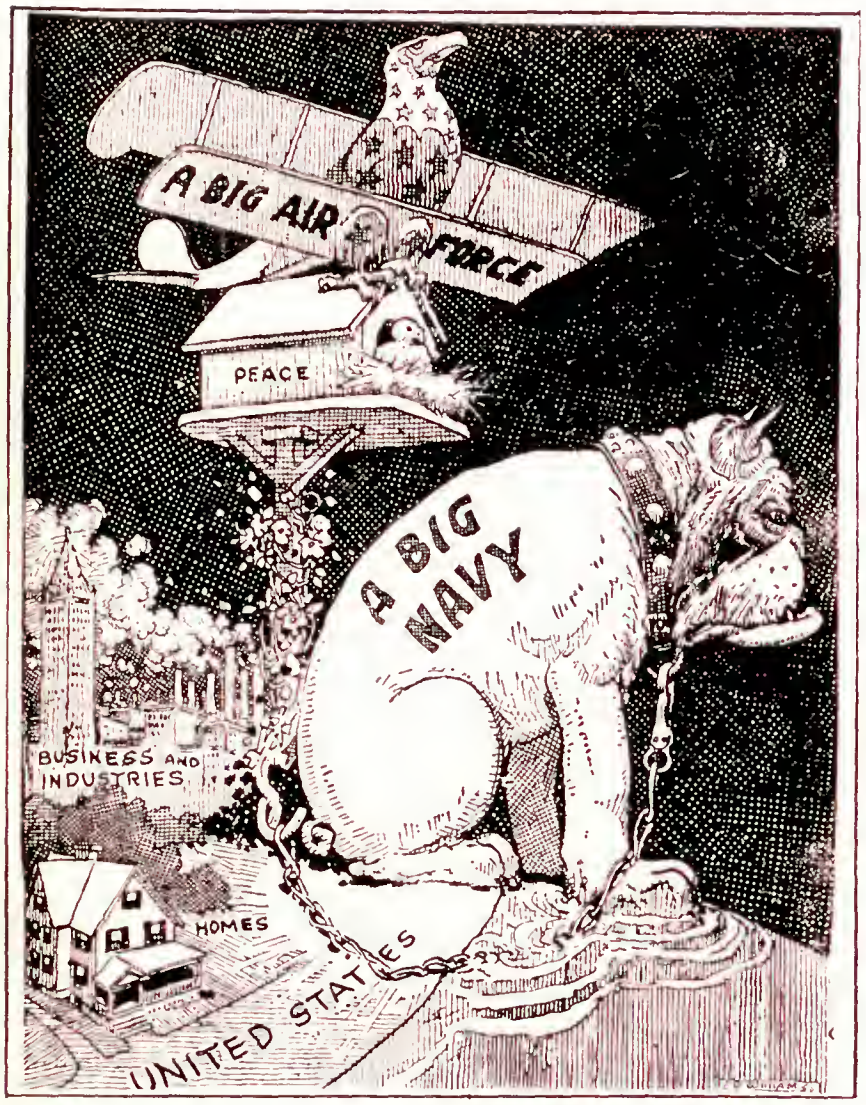
One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL____Editor CARL SANDSTROM____Advertising Manager

CONTENTS

American Flight in Cartoon

For Defense Only



O. P. Williams in Washington Herald

The Most Important Lesson

O. P. Williams in Hearst Newspapers

"Well, Your Wings Are Jest Balanced, Anyway"

Rogers in the Washington Post

At the End of the Rainbow

Talburt in Washington Daily News

Supplied through courtesy of National Aeronautic Association Review.

THE SLIPSTREAM MONTHLY

Published in Dayton, Ohio—"Birthplace of the Airplane"

FRED F. MARSHALL, Editor — CARL SANDSTROM, Adv. Mgr.

Vol. 6 — No. 2

-:- EDITORIAL COMMENT -:-

The General Mitchell Controversy

"Flying Billy" Mitchell in his flying togs.

IT would appear that the public, generally, is inclined to sympathize with Brigadier General William Mitchell in his vehement plea for a separate air service. Those who have come in contact with General Mitchell during the last several years know that this is not a new idea with him. He has advocated this idea for many moons and never hesitated to make his views known publicly when the chance offered itself. There are those who think that General Mitchell is too outspoken and haphazard in his public statements considering the position he holds. In other words, it is contended that "Flying Bill" in his fire and enthusiasm trespasses upon the dignity of his high office by his daring public declarations. As most of us know General Mitchell has gotten himself in the worst muddle of his Air Service career by "telling what he thought" when called upon to testify before the special house aircraft investigating committee. General Mitchell's remarks were so strong against the way the air program was being run under the present condition, and particularly against the efforts of the Navy Department to "cover up" the full effectiveness of aircraft against ocean war vessels that it is feared he may be subjected to disciplinary action and reverted from his present office as assistant chief of the Army Air Service to rank of Colonel.

Secretary Weeks appears to have become very much wrought up over the statements of General Mitchell and requested the general to furnish positive written facts to substantiate his charges. Close upon the heels of this order Captain A. W. Johnson, assistant naval air chief, who had charge of the Navy operations in connection with the bombing tests on German war vessels, came forward and pronounced General Mitchell's statements regarding these operations were distorted and that upon the other hand the general during these tests had wilfully "disobeyed orders" and subjected himself to insubordination.

Captain Johnson charged General Mitchell with failure to carry out instructions and with an utter lack of cooperation in the 1921 tests and said that the Army planes commanded by General Mitchell continued to bomb in defiance of written naval orders and signals from naval ships.

Secretary Weeks hinted that some of General Mitchell's statements cast "supercilious criticism" toward those charged with drafting Army policies, many of them A. E. F. veterans and including General Pershing.

Be this as it may, the public and particularly the personnel of flyers and Air Service employees are inclined to stand by General Mitchell. Socially, the general is unusually popular and press reporters are prone to make sensational headliners from his ever-ready statements or enthusiastic prophesies in connection with aircraft development. A period of hurry-skurry and "pep" follows hand in hand with his periodical tours of inspection or informal calls to the various air stations. The general is known to get what he wants and those under his immediate command will work overtime to carry out "Flying Billy's" wishes.

We feel that General Mitchell's situation should be treated with the utmost discretion by the powers that be. To lose General Mitchell would be a sore detriment to the Army Air Service. We trust the War Department officials fully realize this. To properly judge General Mitchell in his recent outbursts it will be well for all those who judge him to first study the personality of the man carefully.

There is no semblance of the suave scheming politician in General Mitchell's make-up. He is perhaps lacking in diplomacy. He is prone, no doubt, to become visual for the benefit of the cub reporter, but after all General Mitchell knows airplanes as no other man in the whole world. His fiery temperament manifests the spirit we would like to identify and characterize with this new, inspiring branch of the national defense. His achievements far overshadow his official mistakes and his human errings. A man of General Mitchell's type is bound to have many enemies, but we can imagine he despises "red tape" and the wranglings of political intrigues. General Mitchell is sold heart and soul upon aviation. What he has said, although perhaps not as well put as it should have been, merely points out that he has come to the point of exasperation over the inactivity in the Air Services. Taking note that his one ambition is to see all of the various Government Air Services grouped under a single organization and directed by a separate air minister is about to be destroyed. He no doubt means to die fighting, and to "tell what he thinks," even at the cost of his rank.

The pilot, the mechanic, the commercial aviator, the reporter finds it hard to judge "Flying Billy" Mitchell.

A Brief Review of the Aviation Industry in the United States

By The Editor

ON this 21st birthday period of the airplane we feel it well to devote considerable space in a general review of the aeronautical industry of the United States. Not being as fortunate as their European brothers who enjoy a state or national subsidy our American aircraft concerns cannot well afford to assert themselves by advertising in the logical press and therefore in more cases than one are existing to "blush unseen," as it were in this busy old world of radios and automobiles.

When the excited little group of German officers whirled their curtained war cars across the muddy road at the front lines and placed their names on the dotted line of the Armistice documents the magic "hush" wand which stopped the rumble of cannon reached out far beyond this region of battle to the vast, teeming myriads of pounding hammers and swirling wheels which were grinding out war materials. War business went dead with the roar of the last gun and as one gained time to review the stupendous outlay of war goods left where it stood upon that momentous November day of 1918, none held a more staggering aspect than the mass of freshly completed or partially finished aircraft and aircraft equipment. Coming when it did the Armistice created a bad impression upon those who had conducted the U. S. Aircraft Supply Program. It has been said that of all the hundreds of millions spent to get the great machine of aircraft production in running order in this country during the war, not a single plane of American manufacture ever reached the front lines. Had the war lasted a month longer there might have been a better story to tell. As it stood the great masses of aircraft materials were for the most part left as they stood while later much of the salable supplies were disposed of for a song at public auction.

Thus far the "commercial" phase of aviation in the United States has for the greater part been maintained through the availability of these war time supplies which ingenious hands have patched and fitted together to answer an immediate purpose. As far as the real commercial demand is concerned in the United States we might list on one hand those concerns who actually manufacture and find a profitable market for commercial airplanes.

The other manufacturers are kept going (when they go at all) wholly on contracts from the Government and when these are not forthcoming, there is nothing doing at the plants. The Government only recently woke up to the situation that since these plants were the only immediate source of production in case of the possible "impossible" emergency (which term is the peace-time title for war), it was high time something was being done to furnish some aircraft business or these finely equipped factories would either disgrace themselves by turning to the production of automobiles or be absorbed by overhead expenses.

As we have mentioned in another article of this issue we feel that our new policy could manifest no better service than to devote our pages in the discussion of the concerns which go to make all there is to aviation in the United States.

Although perhaps the commercial manufacturer is the least important as to business prominence at this time, we will out of respect for their pertinence and contribution to the morale of things aeronautical, give them the first place on the list.

Of course, Slipstream being a Dayton publication, charity must begin at home and we will accord the Johnson Airplane & Supply Company of Dayton, lead off honors and perhaps rightly too, since it was in the shops of this concern that the D-J-1, the wonderful little light plane which won first place in the Light Plane Race at the 1924 International Air Meet was turned out. Everybody seems to have a word of praise for the D-J-1 job which it is hoped might soon be put out on a production scale as the first practical "flivver" of the air.

The Johnson firm, a $125,000 corporation, is one of the very, very few concerns which is actually thriving without hanging around Washington. The two Johnson boys, Al and Jimmy, know about every individual in the U. S. who owns an airplane or who expects to build one and they have stored in their warehouses every kind of "gadget," as C. G. Grey, our English contemporary would say, which might be needed in patching up a Jenny or in making a fellow eligible for an "On to Podunk" race. In addition they have the most formidable fleet of passenger carrying and all-round general utility airplanes to be found in America under a single management. The Johnson firm carry more passengers during a summer than some of our pioneer stage lines and are broadening out with a passenger carrying service at the Curtiss Field in Buffalo, and another contemplated on the western coast within the near future. Ivan Driggs, designer of the D-J-1, and chief engineer of the firm, is rendering a lot of valuable engineering information to the boys who are regular customers for supplies.

The Advance Aircraft Company, of Troy, Ohio, near Dayton, made a good impression at the International Air Races last fall by displaying their two-seater "Waco" which has a very short take-off and rapid climb although it uses as low as 90 horse power.

Clayton J. Brukner and Elwood J. Junkin comprise the members of the firm. The Advance Aircraft Company recently turned out an eight-passenger job, which has considerable promise. This is one of the more modest concerns which will assert itself no doubt, in a year or two.

Leaving Dayton community we will go east and list the Aeromarine Plane & Motor Company, of Keyport, N. J., which sadly enough has recently succumbed to the business lethargy which is not of their own account. Highly respected in air circles the Aeromarine firm just a few months ago threw up the sponge and suspended activity. Mr. Upperce, who was most heavily interested financially saw that since the Government wouldn't buy flying boats there was no need to stay in the game. The first metal hull flying boat was put out by Aeromarine and created a lot of popular interest but orders did not come in just the same. The Aeromarine Company also launched into a passenger carrying service from the Florida Keys to Cuba, and for a time realized a profitable business with the rush of thirsty souls to this land of Bacchus.

Mr. Paul G. Zimmerman, chief engineer of the firm, and one of the country's authorities on metal-hull construction is practically out of a job and stands as an example of the tragedy that accompanies the love and lure of the aviation game in these dull times of grizzled admirals.

One of the most prominent and promising commercial enterprises which came into being recently in what would appear to be a most formidable organization is the Stout Metal Airplane Company of Detroit, Michigan. Listed as subscribers and directors of this firm are the names of the very largest men in the automotive field, including C. F. Kettering, and Edsel Ford, if you will. Recently Stanley Knauss, publicity director for the firm sent *Slipstream* some photographs of the new airdrome and factory built by the Ford interests for the Stout

Continued on page 25

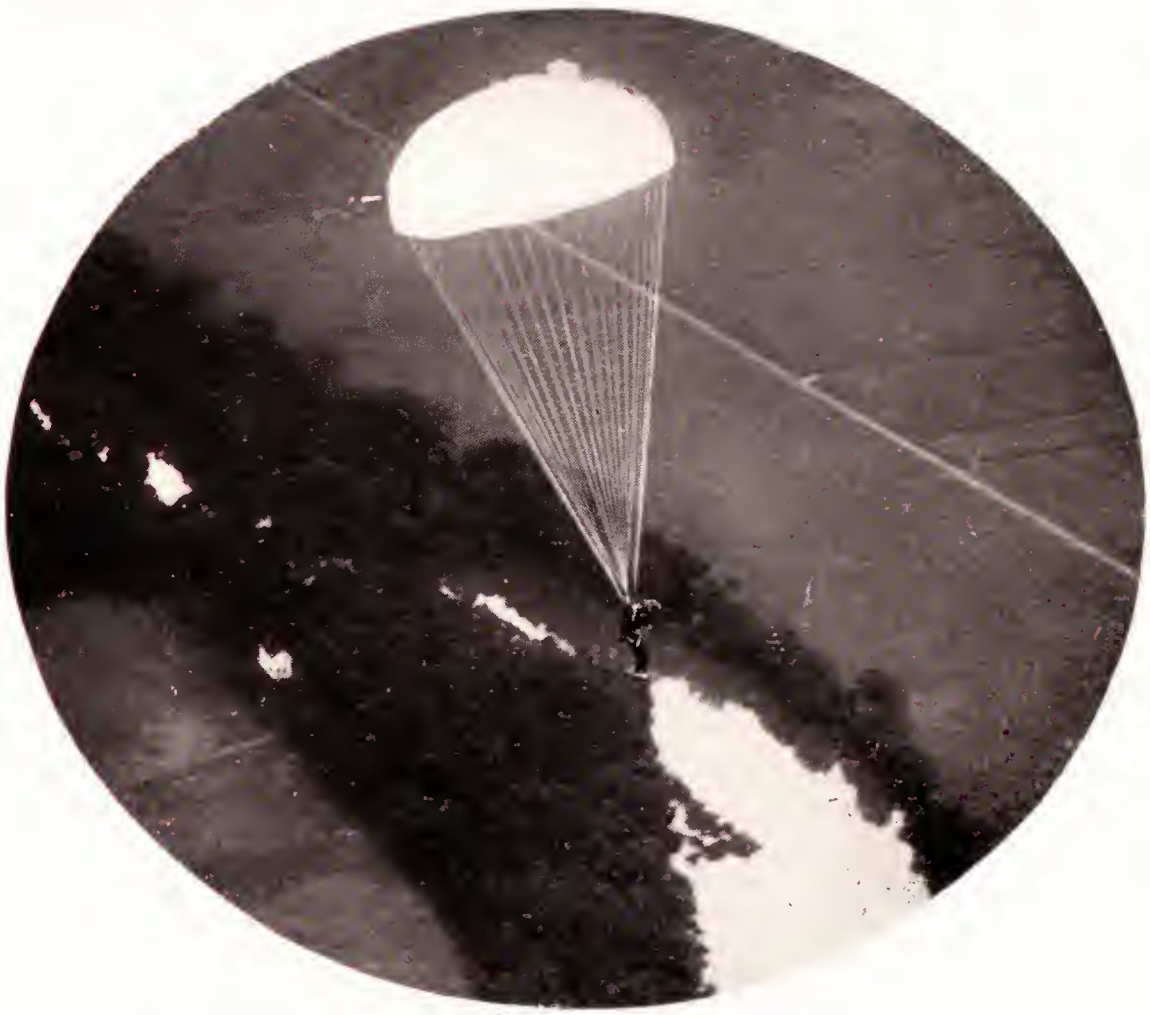
Lessons in Parachute Jumping

How and Why It Is Done

By Sgt. Gilbert A. Shoemaker, Air Service

PRIOR to the World War mention of a parachute always brought on visions of a county fair, a balloon ascension, and the subsequent descent from the smoking balloon by a daring adventurer in a large canvas contraption called a parachute.

Then came the airplane, and in 1916, when the present Air Service was a small establishment known as the Aviation Section of the Signal Corps, our main station at North Island, San Diego, California, was visited one day by an elderly gentleman and his daughter. He explained that he wished to demonstrate the feasibility of a leap from a plane by a person equipped with a parachute. Needless to say, the attempt was looked on as a form of suicide, but after much correspondence with officials in charge the feat was approved. The daughter was taken aloft, and with her parachute attached to the lower surface of the plane, a rope connecting the harness on her body to the chute, she climbed from her seat and leaped into space. Her parachute opened and she sailed gently to earth. Upon examination the chute was found to have split in several places, but not enough to increase her rate of descent. The idea was submitted to the government for adoption, but in the rush to improve our airplanes themselves and the art of flying them, the parachute was apparently forgotten.



"Climb Over the Side, Jump, Pull the Rip-Cord . . . . . That's All. It Gets Boresome in Time,"

thus Sergeant Shoemaker, veteran parachute jumper of the Army Air Service, describes one of the apparent "flirts with Death," which marks an important stage in the course of training given the Air Service aviator. Just how important this item of training is, can be graphically illustrated by the following statement of Lieutenant Harold R. Harris, McCook Field, who jumped from his disabled plane over Dayton, Ohio, and watched it crash in a puff of dust far below as he was gently wafted to earth on the "guardian angel" wings of the parachute. Says Lieutenant Harris: "I loosed my belt and jumped clear of the fuselage—I went catapulting through the air, turning over and over . . . . . three times I tried to locate the cord ring . . . . . finally I found it . . . . . the chute opened with a jerk . . . . . I landed on a fragile grape arbor in the back yard of a residence in North Dayton, quite unhurt by the fall . . . . . I asked for a cigaret from one of the spectators who seemed more bewildered and scared than myself."

After the Armistice the greatly enlarged and improved Air Service began a survey of the parachute situation and demonstrations of all known types of airplane parachutes were made by representatives of various allied countries and by individuals who had ideas along that line. Many types were offered and tested out, the test at first being made with the inventors themselves as the jumpers, and later with lead weights substituted in their stead, the latter method being found the safer one. The majority of the parachutes tested were of canvas construction, but it was found that they could not withstand the great air pressure so well as those made of silk, which withstood it well and were also lighter and not so cumbersome when packed.

Development was carried forward on the silk chutes, and with the idea of attaching the chute

to the person, as it was contended that a chute worn on the person would remain intact as long as the wearer, whereas a chute attached to the plane might be rendered useless by collision or fire. The U. S. Army type A chute, worn on the back, as a pack is worn, was the result. The chute itself, all shroud lines, and all thread used in sewing were of silk. The harness was of webbing with 10,000 pounds tensile strength; the 40 shroud lines had tensile strength of over 200 pounds each, and the silk used was the best on the market. Tests with lead weights from planes in a dive, speeding at 140 miles per hour, showed that the chute would withstand a pressure of about 10,000 pounds, much more than the human body could stand. Weights of 400 pounds were used in the tests.

Showing live jump from plane, with chute opened.

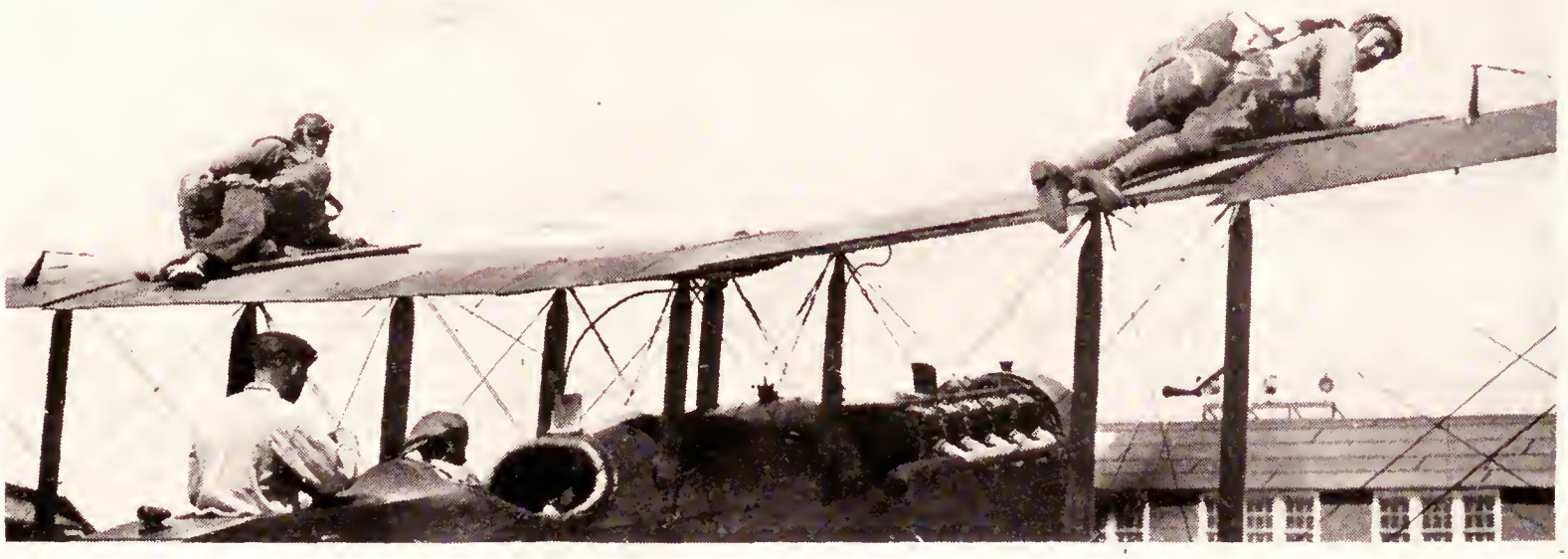
The writer was ordered to Kelly Field in the winter of 1919 for the first Air Service course in parachute jumping and maintenance. After weeks of experimental folding of the chute the day dawned for the first live jump. The program was to ascend to a height of 3,000 feet, climb out to the side of the fuselage, from your nice comfortable seat in the plane, and when over the center of the flying field to leap off.

Notwithstanding many hours in the air and great confidence in the chute I wore, I climbed into the cockpit feeling like a man well along on a suicidal program. The pilot and I had agreed to eliminate any human weakness by arranging a system for my departure from the plane, that was as follows—when I took my place on the step on the side of the fuselage he would grasp my right hand in a tight clasp, my left would reach for the rip cord, the function of which was to release the chute from its casing, and as I attained my grip on the rip cord he would release his grip and I would be off.

This we followed to the letter. After counting three before pulling the cord, this to allow me to clear the tail surface of the plane, I gave a mighty pull, and, to my great relief, found myself swinging gently in the great open spaces over Kelly Field and wondering why I had lost so much sleep over this little stunt. I felt more secure than when riding in the plane I had just left—or in any other plane, for that matter. The landing was soft, for with feet pressed together in order to give bracing to each ankle, and knees a trifle bent to absorb the shock of impact. I barely lost my balance upon arriving on the field.

The next step was an organized course in parachute work, and students were assigned to us for instruction in folding and repairing chutes, and jumping. While we carried on this work experiments were going on in the Engineering division to cut down the weight and size of the chutes. As they were then they constituted an encumbrance, as the French said in a review of our work, but the principle was right, as we suffered no accidents whatsoever. As we found in our jumping that certain changes could be made with safety, the changes were authorized and the size and weight of the parachutes diminished.

All pilots were sent to us for a course of instruction in folding and jumping. While the course lasted only two weeks, in that period the



Preparing for a double pull-off by instructor and pupil

student folded his chute at least fifty times under the eye of an instructor until he could fold one that met the standard for a jump. During this time of constant association with the parachute he acquired confidence in its ability to bring him safely to earth; and when the time came for a class graduate, the commencement exercises, consisting of an assembly on the field and a live jump by each, we always had many applicants for the honor of being first of that class to make the leap. We had one experience with a student which gave us food for thought. He was out on the step, his hand was on the rip cord, and he showed no sign of nervousness, but after releasing his hold on the plane he fell fully 400 feet before his chute opened. We saw his body begin to spin in the air while falling, and to the best of our knowledge the centrifugal force of his spinning body caused his limbs to fling out and, due to the fact that his hand gripped the rip cord, the chute was released by this involuntary action. What if his hand had not held to the cord? He had become "frozen," or unable to make any voluntary move, caused by fright or shock. We reasoned that he would have fallen to his death and began casting about for a safer method of introduction to the parachute.

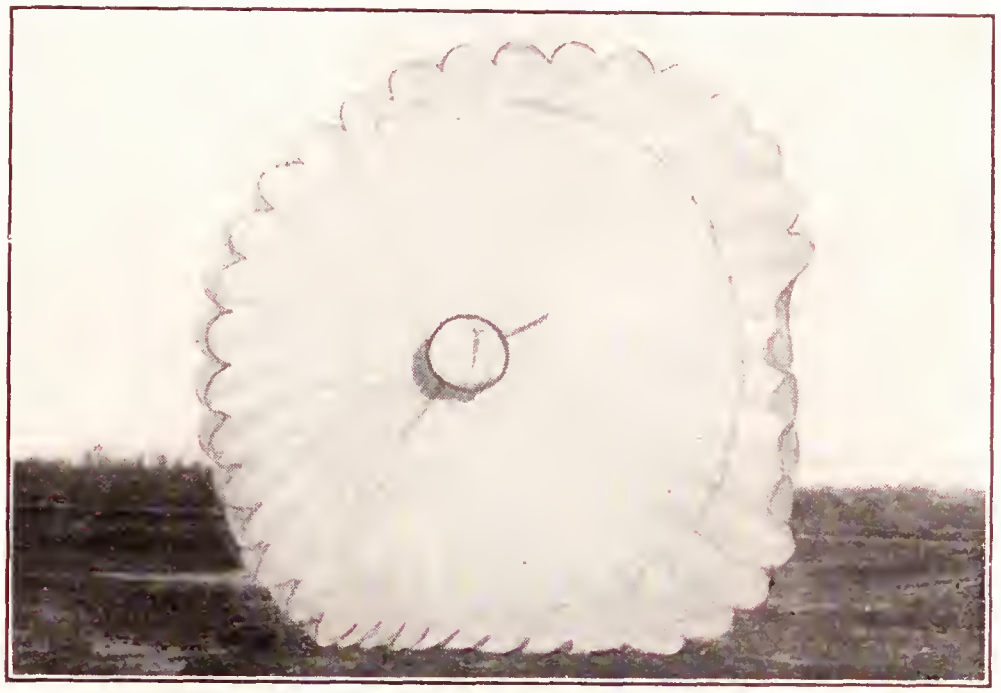
It was decided that if the chute was open when the student left the plane all reason for failure would be eliminated. It was found by our engineers that the upper wing surface of a DH4-B, the type plane we were using, would or should sustain the added weight of a person while in flight without endangering the safety of those aboard, so in the fall of 1920 I made the first jump from this position. I found my part of it not hazardous in any way, the chute being opened by a pull on the cord while I crouched on the top of the plane with a rope attached to the strut to steady myself. The pilot reported no difficulty in operating the plane with the additional weight, so we were off on a new tack, as we knew that with a man on each wing the plane would be evenly balanced and would surely carry the weight. A jump by two of us, one on each wing, was next, so we were now enabled to go up with our student on the wing across from us, coach him with signals, and jump with him. Hundreds of students have been jumped with this system and never have we had an accident.

Showing the position of the seat type parachute pack now used as standard by all U. S. pilots.

All this instruction work is carried out with the standard training type chute, as described before, with a few improvements. We realized that a pack worn on the back was not the thing for a pilot in service flying, as it was too cumbersome. A type known as the seat pack was developed, which takes the place of the cushion on the seat. The harness is soft and the entire pack weighs only twenty pounds. The diameter of the chute is twenty-two feet as compared with twenty-eight feet for the training type. All pilots are now equipped with the seat pack, and in the past year eight of them have saved their lives by resorting to their chute when a crash was imminent. A discovery of interest was that, by cutting the silk in the panels of the chute on the bias, a lower rate of descent was obtained, the explanation being that the cord of the material offered more resistance to the air flowing along its surface than if it were cut straight. I have

been asked many times to describe the sensations one gets when jumping. The first one was a real thrill, but the confidence aroused by the perfect functioning of the chute made any future thrill hard to raise, as one has nothing but anticipation of a pleasant glide to earth before him when he knows his chute and its safety factor. The life of a parachute instructor, with its schedule of jumps with each class, becomes dull, and we often were forced to think up some new stunt that would drive away the ennui of the routine.

We made our mascot—Bing—the most famous dog in the world by taking him up for a jump in a chute fitted to the needs of the canine aviator. He lay on the wing beside me and when we were over a spot that would land him on the field I released his chute. He only registered great surprise when he saw me departing aboard the plane while he was hanging in something, he knew not what, up among the birds who flew over to see how that lowly animal of the earth came to be among them. I jumped after him and, due to greater weight, soon caught up with him in descent. We were nearing the ground and I heard him bark at several jack-rabbits which he spied from his advantageous observation post. Upon landing he made use of the knowledge so gained by an immediate rabbit hunt.



The aviator's parachute opened. Made of finest silk which is strong, light weight and easily folded into a small pack.

The question of whether one's body would blow back into the tail surfaces when leaping from the cockpit of the plane was a weighty one before our first jump. Many contended that this would happen, but the experience is much like that of leaving any fast moving object—your body carries the same speed as the object just left for the first few seconds and then gradually falls back. In other words, you do not drop like a plummet, but describe a large arc. Leaving the plane while in a spin was deferred for a long time, but we found it good sport, as the force of the spinning plane throws your body in a straight line away from the fuselage and gives you quite a kick.

Questions often asked, and their answers, are: Do you land hard?—No, you get the same shock that would be had in a leap off about a ten-foot platform without a chute. This also depends on the velocity of the wind, as the greater the speed of the wind the faster you travel in a direction parallel to the ground. You therefore land harder if the wind is strong.

What do you think about while coming down?—Only the usual things which might be on your mind at the time, such as the date for the evening, etc., except as happened once on a 7,000-foot jump. I was carried past the field and was drifting over a swamp, to land in which might be serious. By side-slipping the chute, which is the way we guide ourselves to the place we wish to land, I found that I might miss the swamp, but it looked as if the last trees might not be cleared, so the thought uppermost was, will it be a broken leg, arm, neck, or what? I skidded down through the last tree with arms about my head to protect my eyes from the branches and drew up my knees to help cover. Luck was with me, for I broke through without spilling the air from the chute and landed safely.

What would you do if it did not open?—Seems foolish, but we never worry, as in practice we wear two chutes. If the first fails we have a reserve. This saved a captain's life some time ago. He had taken our course and returned to his station and decided to show his new stunt. He leaped from 3,000 feet (there is a rule which prohibits jumps from a lesser altitude than 1,500 feet), but his first chute came out in a tangle, through some fault in folding. He fell about 2,000 feet before he reached for his second chute, which opened properly and brought him down in safety except for a few bruises sustained when the harness tightened on him after his long fall.

We have to watch our jumpers now to keep them from making a practice of "holding their rip cords," which they do to get more kick out of the jump by experiencing the long fall.

The Light Plane

By Ivan H. Driggs

Designer of The DJ-I, Winner of First American Light Plane Competition

III

THE January issue of *Slipstream* gave a short outline of modern theoretical aerodynamics as applied to light plane design. This discussion may have been somewhat obscure to the non-technical reader. A series of charts or curves should serve to clear up such obscurity as well as to more definitely emphasize those quantities most important for each flight characteristic.

Accordingly a series of light planes is chosen for investigation as given below:

Weight — 500 pounds in each case.

Span —	15′	20′	30′	40′
Power —	16⅔	20	25	33⅓ Horsepower
$\frac{W}{S}$ =	33⅓	25	16⅔	12½ pounds per foot
$\frac{W}{P_M}$ =	20	25	20	15 pounds per h. p.

A_P = 2 square ft. in every case

Revolutions of all motors 1750 r.p.m. for maximum power.

From this data Figure I is calculated using equation (5) from previous article and ordinary values for propeller efficiency. These curves are sufficiently labeled to be self-explanatory. They themselves are interesting only in the conclusions to be drawn from them in the development of further charts.

Items of importance for light plane performance, or the performance of any airplane are as follows:

I. Run along the ground before taking off.
II. Climbing angle after taking off.
III. Time to a specified altitude.
IV. Comfort in gusty weather.

From Figure I each of the above characteristics will be investigated and shown by suitable curves.

I. **Run to take off.** The length of the run along the ground is influenced by a great number of quantities, namely, the thrust available, the resistance of the airplane, its weight, the friction between ground and running gear, and the minimum speed at which the airplane can fly. In order to simplify the calculation the friction due to running over the ground is assumed constant. This in a measure may be controlled by the designer by the load imposed upon the tail skid. This friction is of short duration since the thrust tends to raise the tail quickly, also the parasite resistance is taken as constant as the designer has exerted every effort to reduce this quantity to the absolute minimum. This series does not attempt a method of performance calculation but rather it is designed to show certain rules or laws that govern airplane performance. The induced drag has been eliminated also since this quantity does not appear until the airplane is sustaining some weight. The pilot runs the airplane along the ground at such an angle that the lift is nearly zero until he has reached flying speed, when he quickly pulls back the stick, increases the angle of attack and leaves the ground.

Figure II shows the results of the calculation for take-off run for the series of light planes at various values of minimum velocity or take-off speed. From these curves may be deduced the following theorems:

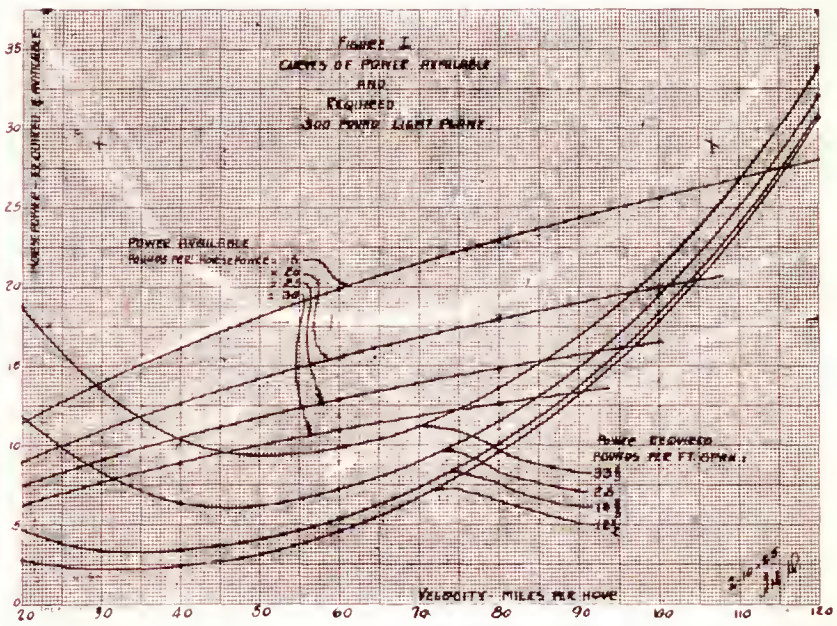
III. Length of run to take off varies directly as the Power Loading—pounds per horsepower, or expressed conversely, with constant weight and take-off speed the length of run varies inversely as the horsepower.

IV. Length of run with constant power varies as the take-off speed squared. Since with constant airfoil the minimum speed varies inversely as the square root of the wing area it follows:

V. Length of run varies inversely with wing area, power and wing section being unchanged.
This leads to:

VI. For the same length of run to be maintained the wing loading should be decreased in the same ratio as the power loading is increased.

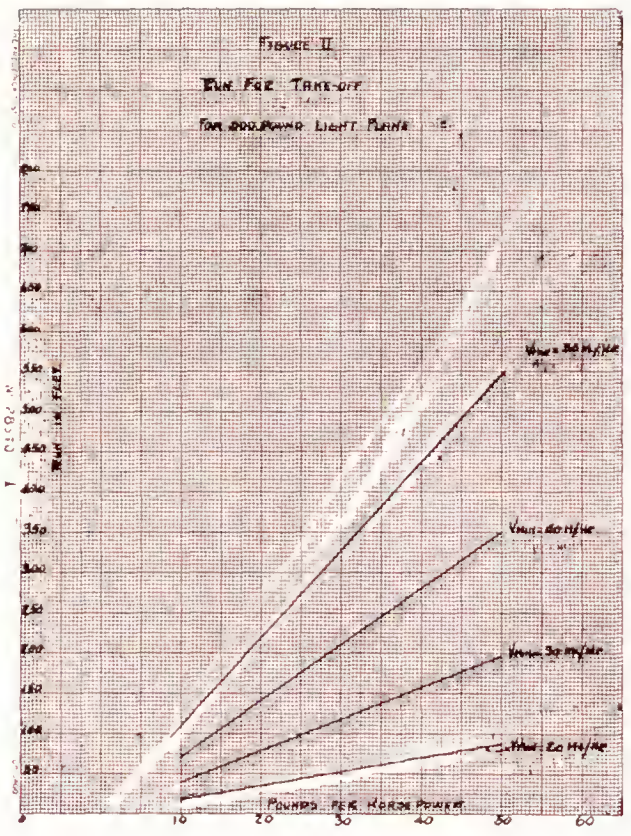
THIS explains why a light plane with a wing loading of 6 pounds per sq. ft. and a power loading of 20 pounds per horsepower will run the same distance as a larger airplane loaded 10 pounds and 12 pounds per sq. ft. and per horsepower respectively. By using one of the new efficient high lift wings there



is no reason why the light plane with its high power loading should not do equally as well in this respect as a great number of larger airplanes considered very satisfactory.

II. **Climbing angle after taking off.** The angle of climb is of very great importance since it controls the height of obstructions that may be cleared in a given distance. This with the run before taking off determine the size and condition of a field from which the airplane may fly. Climbing angle is the resultant of two other quantities, the rate of climb or climbing speed and the velocity at which the climb occurs. This is a very good rate of climb as desired at a very low forward speed. A high rate of climb alone is of little use if this occurs at a high velocity.

The extension of the calculation to the determination of the maximum rate of climb and the velocity at which such climb occurs gives Figure III. This chart shows the relation existing between power and span for various slopes of the angle of climb. This slope is given as the height that will be reached in a space of 1000 ft. It represents the obstruction that may be cleared 1000



feet away from the point at which the airplane leaves the ground.

This chart is very interesting and instructive. If the curve marked 100 in 1000 be taken for analysis as a fair average it is found that for this slope to be obtained with a given power on the chosen plane a very definite span is required. Also that as the power decreases to its lower values the span should increase at a very rapid rate. This shows the fallacy of attempting to construct a low powered light airplane with spans of from 10 to 15 feet as is sometimes suggested. This series of curves also show that if a practicable climbing angle is to be maintained a definite relationship may be found between power and span that will be the most effective and the cheapest as to cost and maintaining. To illustrate this: An angle of 1 in 10 calls for 31½ horsepower at a span of 16 feet. If the span be raised to 20 feet the power is reduced to 24. It probably will be found cheaper and lighter to use the lower powered motor and increase the span to 20 feet. On the other hand for the same slope a span of 28 feet requires 19 horsepower, if the span be increased to 32 feet the power required reduces to 18¼. A designer in this case would more than likely choose the higher power and the lower span.

Good judgment must be relied upon to dictate the correct balance between power and span. No mathematical treatment can be given.

In order to make this section somewhat useful, Figure IV is given which shows the climbing angle plotted against span loading for various values of power loading. This chart may be used as a rather rough means of estimating the slope of the climb for any new design.

III. **Time to 5000 feet.** This particular altitude is chosen for convenience and because it represents a fair height for cross country flying. The time spent in reaching any definite altitude is dependent upon two quantities, the rate of climb at the ground and the height at which the rate of climb becomes zero, or absolute ceiling as it is called.

Charts V and VI are plotted on a basis of the time to 5000 feet against span loading. Again the very marked influences of span is demonstrated especially at lower powers. These curves are both useful and instructive. Figure V may be used for a rough estimate of the time to 5000 ft. for any new design. In one example chosen a very good check is obtained. The D-J-1 climbs 5000 ft. in 11 minutes actual test. Its span loading is 18.9 and power loading 22.7. Figure V gives the time as 10.8 minutes. This is well within the accuracy of the test observation.

Figure V also demonstrates the very great rapidity with which the time to altitude decreases with increased span, especially for the higher power loadings. This again shows the fallacy of low power with small span. It simply serves to reiterate. Keep the span large.

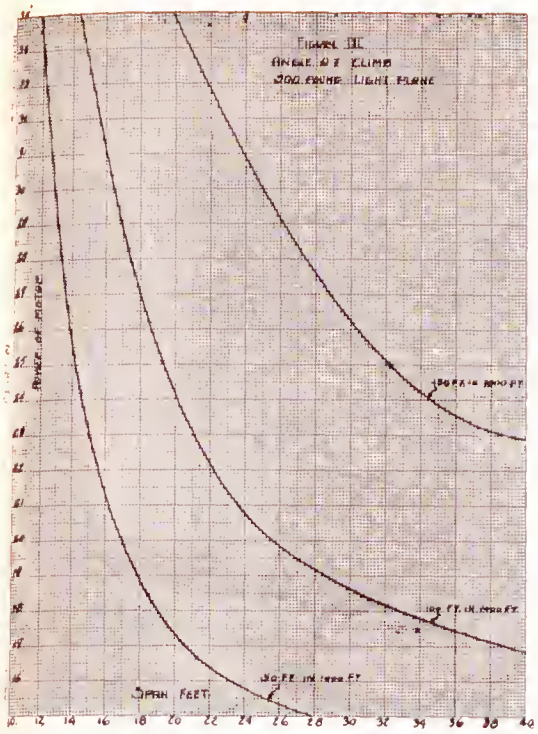
Figure VI, in which span is plotted against power for different values of the time to 5000 ft. illustrates a fact very similar to that which was pointed out in the case of climbing angle. For any design there is a balance between power and span that will be most effective and the most efficient as to cost. If the designer wishes his airplane to climb to 5000 ft. in 12½ minutes he may use an infinite number of combinations of span and power. As the span is increased from its lowest values the power necessary decreases quite rapidly. At the higher part of the range of span, however, just the opposite occurs, a great increase of span is necessary to lower the necessary motor power but little. The correct solution of the problem is left to the individual.

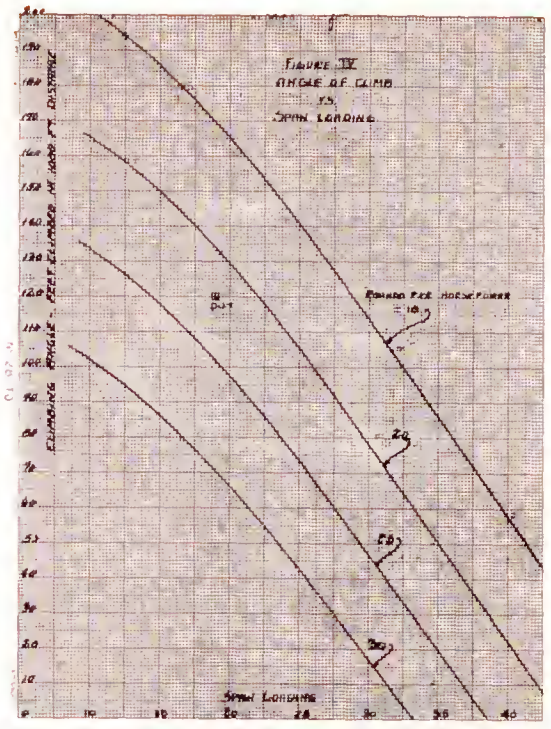
IV. **Comfort in gusty weather.** To a person traveling by airplane this is very important. No one enjoys being tossed about like a feather in a breeze. This comfort cannot be expressed mathematically or shown by curves, because there is no definite coefficient that can be used to express the idea. Comfort may be properly divided into two separate conceptions, one of actual physical comfort of riding smoothly and one of mental comfort in the feeling of safety. Physical comfort depends upon how much the airplane is affected by bumps. The feeling of safety is present when the airplane answers controls readily and is not easily stalled, that is, when the reserve power is ample for all emergencies.

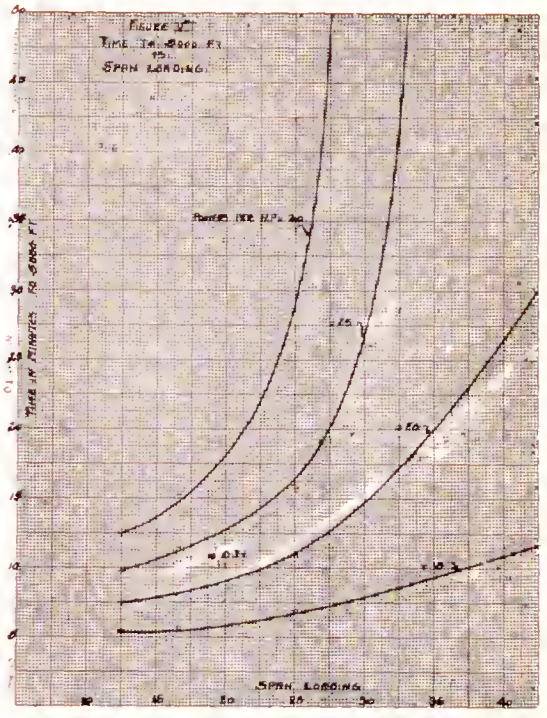
The property of an airplane that makes it ride bumps comfortably is dependent upon its landing speed. The lower the landing speed the greater will be the effect of bumps. This may be demonstrated as follows:

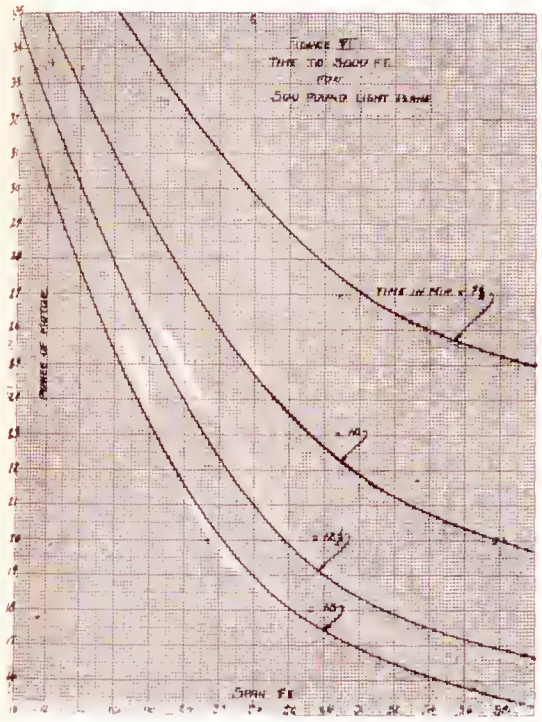
The effect felt in a bump at any given speed is dependent upon the ratio of weight supported by the wings at any instant to the possible weight that the wings can support at that speed and instant. If two 500-pound airplanes both are flying at 80 miles per hour, one with a landing speed of 40 and the other with 20, and if a gust strikes each with the same intensity and at such an angle that their attitude to the relative wind is the same as for landing. The first will experience a force of $\left(\frac{80}{40}\right)$ or four times its own weight, the latter a force of $\left(\frac{80}{20}\right)^2$ or eight times its weight. These forces are the maximum that may happen due to gusts and very rarely occur. This shows however that the relative force which a gust exerts upon any airplane is dependent upon the minimum speed at which it may fly. From this is drawn the conclusion that the landing speed should be high. If the consideration of comfort were the only criterion for airplane design this conclusion would be justified. In reality however a balance must be reached between comfort and ability to take off and land, both of which demand a low minimum speed. It is often heard that light planes should land at 20 to 25 miles per hour. This can be done with present developments but only at the sacrifice of comfort and utility. Such an airplane becomes useful only in fair weather.

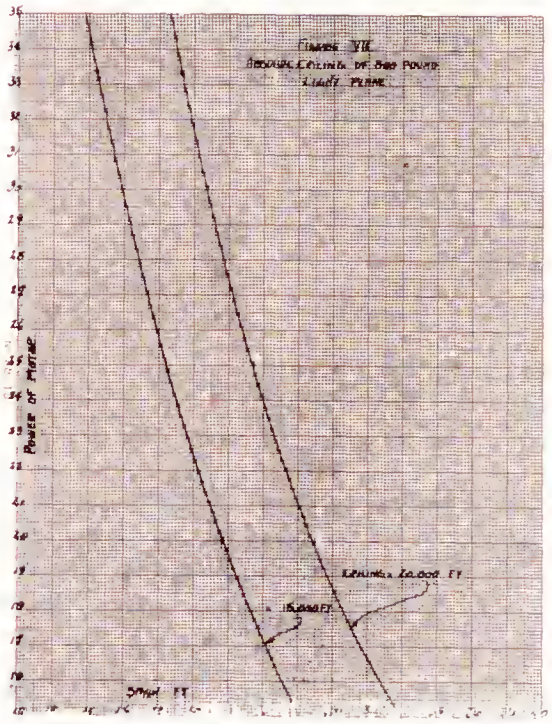
The feeling of safety as suggested above is due to relative reserve power. The absolute ceiling offers an excellent measure of this relative power. If it be arbitrarily taken that no airplane is safe to fly that has an absolute ceiling less than 15,000 feet. Figure VII shows the dependence of such safety upon power and span. The extremely rapid decrease in motor power required for a given ceiling as the span increases is remarkable. For a ceiling of 15,000 feet to be attained a

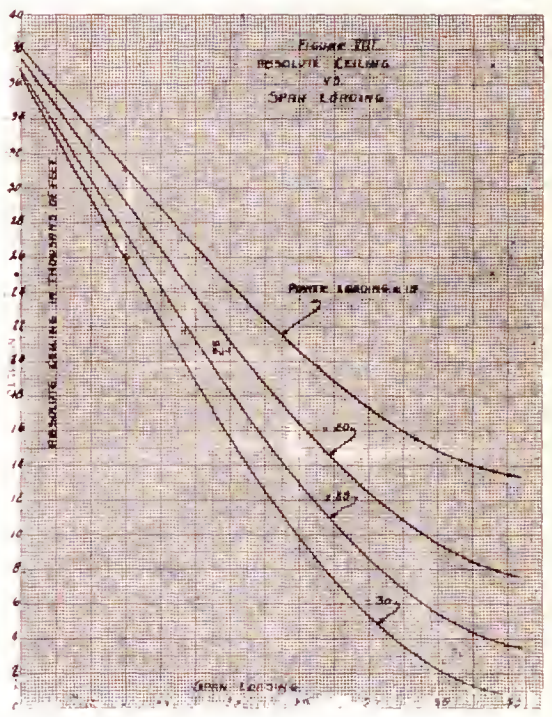












light plane of 500 pounds weight and 16-foot span calls for 29.8 horsepower. If the span be increased to 26 feet the power necessary becomes 15. The power loading in the first case is 16.78 in the second 33⅓, or practically double.

If it be admitted that the theory is correct that ceiling is an indication of safety and maneuverability at the ground Figure VII demonstrates very definitely that high power is not necessary if the airplane has sufficient span. The light plane is the only airplane that can use this fact without excessive span and wing weight as pointed out in the previous section.

Figure VIII is appended for the estimation of ceiling for a new design.

Summary: It is well to go back at this stage and summarize the ideas that have been brought forward. But two of the above requirements depend in any way upon wing area or landing speed mainly run before take off and comfort in gusty air. Unfortunately these two requirements are diametrically opposed. A small run calls for a low landing speed or high wing area, while comfort demands a low wing area or high landing speed. This is a case in which a compromise must be affected until such a time as a means of varying the lifting capacity of the wings is devised.

For high climbing angle, rapid climb and good ceiling on the other hand there is no disagreement. Increasing either power or span has a similar effect upon each of these characteristics. An increase of span lowers power required very rapidly at first for a chosen climbing angle, or time to 5000 ft. As the span increases very greatly, however, the power ceases to drop off so rapidly. This point suggests that for any design a proper balance may be obtained that will make for the greatest all-around efficiency. However, the span is shown to be much more important in the case of ceiling. It may be demonstrated mathematically that such a variation with span is more rapid than is the case with power. Figure VII illustrates this point.

This section serves to more clearly fix in the mind the rules laid down in the previous article with this addition:

Rule V. Do not try to make the landing speed too low. To do so will make a fair weather airplane.

* * * *

In the March issue of *Slipstream* the general layout of a light airplane will be discussed, and data given on estimation of weights and control surface areas.

AVIATOR'S SLANG

"Job"—Designation given to any particular design of an aircraft.

"Wash-out"—A disastrous crash, generally meaning a complete destruction of the machine—and perhaps also the pilot.

"Prop"—The propeller.

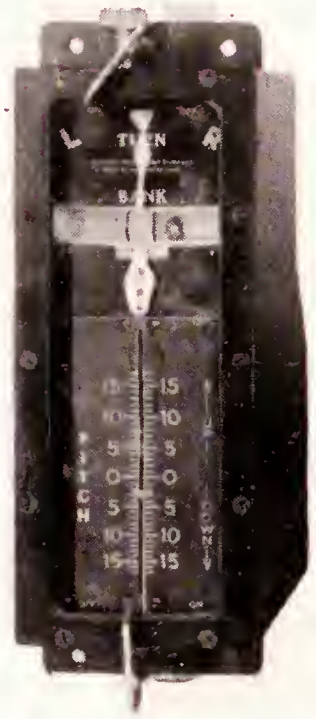
"Give 'er the gun"—Equivalent to the motorist's expression of "Give 'er the gas," and meaning the same thing.

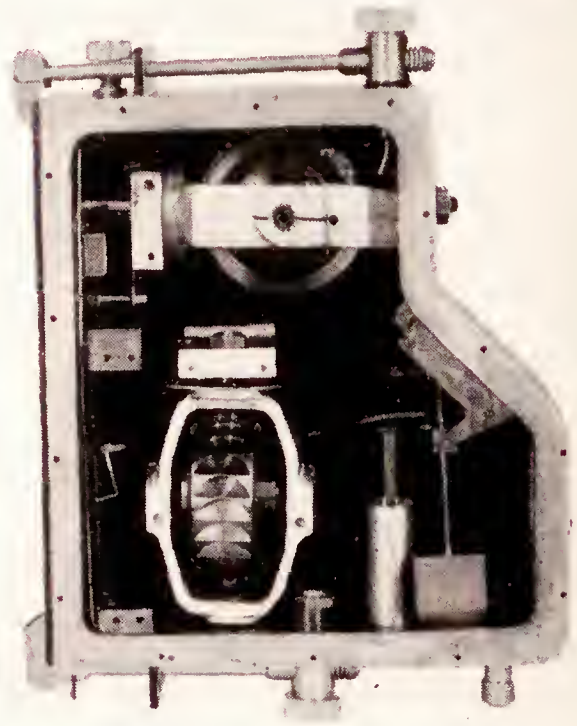
"Set down"—To land.

"On his tail"—The position of one plane slightly in the rear and above the other plane—a position an aviator strives for in attacking an enemy plane.

"Taxi"—To run the plane under its own power along the ground.

Pioneer Instrument Company Perfects Inductor Compass





The accompanying illustrations show two views of the famous Earth Inductor Compass perfected by the Pioneer Instrument Company of Brooklyn, New York. This valuable aerial navigation instrument saved the day for the world flyers by making it possible for them to steer their course through fogs and storms; when the earth was wholly obscured from view.

Loening Firm Scores Triumph

The accompanying photographs show two views of the interesting new Loening Amphibian (400 h.p. Inverted Liberty) plane recently delivered at McCook Field, having been flown over land by Lieutenant W. H. Brookley, from Bolling Field, Washington, D. C., on February 13.

This is an entirely new type of American metal airplane which has been undergoing secret development at the Loening Aeronautical Engineering Corporation plant in New York City, for the last year. The trip made by Lieutenant Brookley with this ship from Langley Field, Hampton, Virginia, marks the first cross-country flight ever attempted by an amphibian flying boat in this country.

The Loening Amphibian weighs 3,300 lbs. empty and 4,900 lbs. fully loaded with a crew of three men and a gas capacity of 140 gallons. She has a cruising radius of about 700 miles. This ship is the first test plane of a possible order of ten to be built for the Army Air Service by the Loening firm. See further details on page 16.

The Dedication of Ford Field, Mich.

By Technical Sergeant X. L. Horn, A.S.

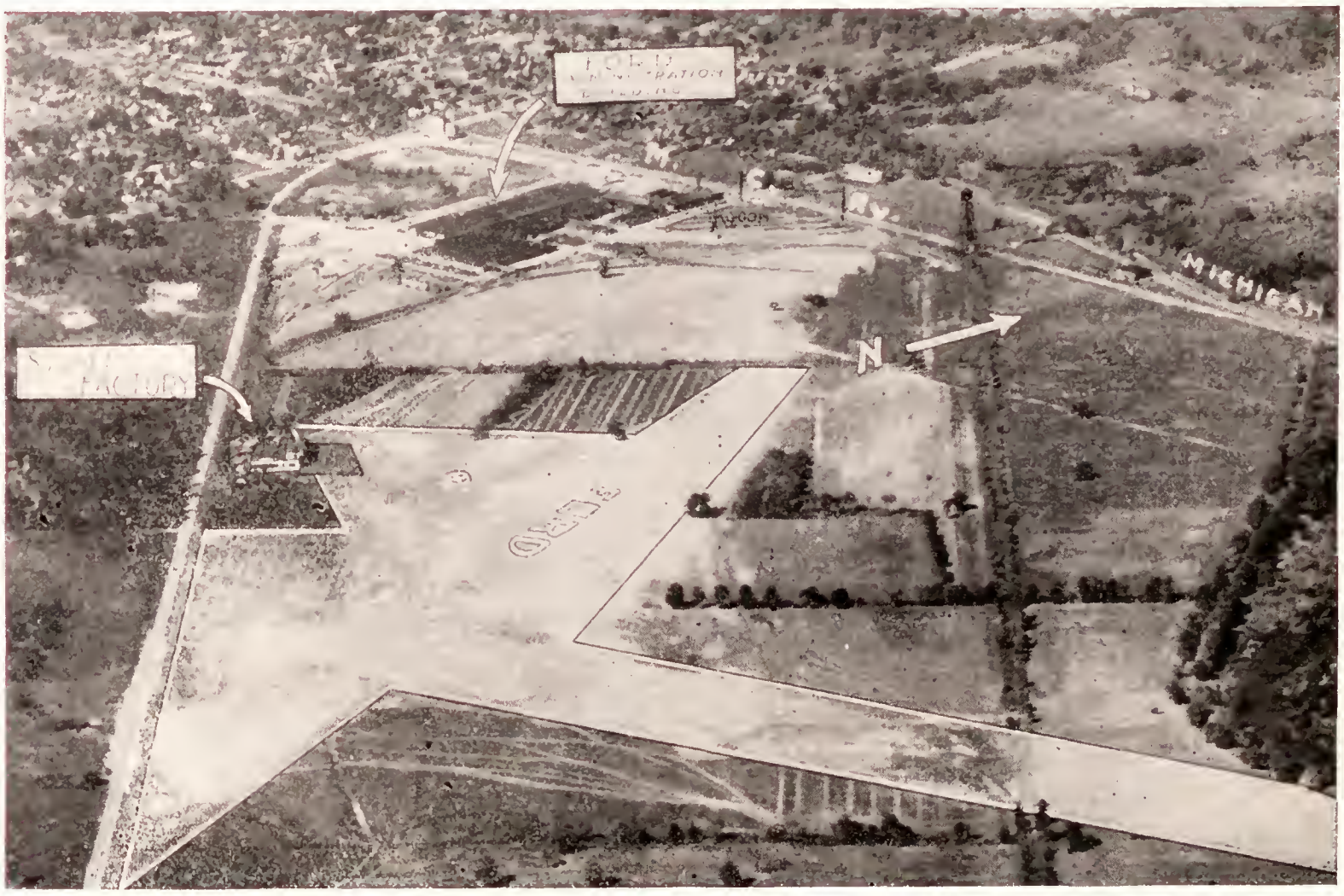
HENRY FORD saw his first Aerial Circus on January 15, when a flight of Curtiss pursuit ships, piloted by Major T. G. Lanphier, Commanding Officer of Selfridge Field, Lieutenants Hurd, Johnson, Bettis, Lyons, Mathews, Minty, Rich and Warner and Staff Sergeants Wasser, Manning and Wiseley, also a DeHaviland plane piloted by Lieutenant Whitehead and Eddie Stinson as passenger and a "Jenny," piloted by Lieutenant Ellis, with Mr. William Mara of the Detroit Board of Commerce as passenger, visited him at Ford Field, Dearborn, Michigan, and were his guests at a luncheon.

"That's wonderful; I never saw anything like it before," the host remarked after the thrilling performance had been concluded and the fast pursuit ships had started into the mist on the return trip to Selfridge Field, Michigan.

The visit was in the nature of a dedication of the new field, which was opened several months ago but on which no Army fliers had ever landed. It was also in the nature of an introduction of Army and Commercial aviation and of army pilots to those in civil life who are vitally interested in the welfare and future of air commerce.

Harvey S. Firestone, Ford's intimate friend; William B. Mayo, his chief engineer; Ernest G. Kanzler, Second Vice President of the Ford Motor Company; W. H. Smith, Ford Research Engineer; William J. Cameron, Editor of the Dearborn Independent; William B. Stout, Stanley E. Bnauss, George Prudden and George Hoppin, all of the Stout Metal Airplane Company located on the field, were the other guests at the luncheon served in the dining room just back of the new experimental laboratory at Dearborn.

After the luncheon the Army fliers, Ford and his guests inspected the Stout Metal Airplane factory where production of the Stout Air Pullman type of all-metal plane is in progress. At the luncheon the conversation was decidedly in the air. It was pointed out to Mr. Ford and his guests that the total number of fighting pursuit ships now available for the defense of the United States is regretably small. In discussing the standing of the United States in aircraft, Ford was told that other



Aerial view of Ford Airport, Dearborn, Michigan, just outside of Detroit. The name "Ford" appears in letters 150 feet high, made of white crushed stone, and is visible from an altitude of 10,000 feet. The two main runways are 3,700 feet long and 300 feet wide. At the left center is located the new factory of the Stout Metal Airplane Company, built by the Ford Motor Company, and offered to this organization merely for the purpose of "watching aviation development," as expressed by the donor, Edsel Ford.

countries have hundreds of such ships as those with which the First Pursuit Group is now supplied.

"I know," he said, "but the brains are over here and they are all working." And who is there to deny him?

One of the Curtiss ships was equipped with skis, exciting much curiosity and discussion. During the luncheon Mr. Ford turned to Mr. Firestone, who was seated near him, and laughingly remarked: "Well, Harvey, these wooden skis are going to hurt your business unless you think up a formula for a hard rubber one." Which facetiousness caused Mr. Planck, of the Detroit *Free Press*, to remark somewhat later on after an expansive sigh, "Well, Mrs. Ford certainly is a good cook."

Mr. Ford proved to be a very congenial and entertaining host and insisted upon having his picture taken with the GENERALS, as he called the visiting pilots. "You see," said Mr. Ford, "I don't understand all those little funny things you wear on your shoulders and collars, so by calling all Army men GENERAL and all Navy men ADMIRAL, I am forgiven."

Mr. Ford is deeply interested in aviation, both civil and military, and has extended a personal invitation to all Army pilots to land on his field at any time.

The building of Ford Field was but a matter of days. It is said that Mr. Ford with his chief engineer, Mr. Mayo, were one day looking over the ground when Mr. Ford suddenly remarked: "Well, Mayo, we'll have an aviation field here next week." There was. The next day men, tractors, graders and other necessary machinery were hard at work, and within a week the whole field was practically completed. The field is smooth and large enough to accommodate any type of ship and its facilities are excellent.

Aviation, both civil and military, belongs to the same great family and it is essential that between the two there be created an esprit de corps, unbreakable and lasting through the ages. Flights like this will do much to establish this esprit de corps by impressing upon a rather thoughtless public the dire need for the best and the greatest air service in the world.

New Type of Airplane for Army Air Service

A NEW type of American metal airplane, the Loening Amphibian, which has been secretly under development for over a year, made its first public appearance at Bolling Field. The first one, of an order of ten being built for the Army Air Service, was delivered by air to Washington, piloted by Lieut. Wendell H. Brookley, who flew the machine from the contractor's factory on the East River, New York City, to Mitchell Field. From there he made the cross-country trip to Bolling Field. This was the first cross-country flight ever made by an amphibian flying boat in this country. Lieutenant Brookley's trip was without incident and he reported that the new craft handled well in every way.

Aviation experts, all over the world, have been awaiting with interest the demonstration of the Loening Amphibian, as it represents a very daring and novel metal design. For the first time, in the development of the art, the ordinary tractor type of biplane has been modified, so that the machine is capable of landing on either land or water, with ability to start from or alight on either, at a moment's notice. No extra floats or other devices are used, as the new design obtains its amphibious characteristics by the shape of the main fuselage body itself, the bottom of which is shaped like a flying boat hull. To this is attached a folding landing gear, an ingenious device, which is operated by an electric motor—the pilot merely throwing a switch in order to raise the wheels for water landing, or to lower them for alighting on the land.

As already demonstrated in flight, the new Loening Amphibian, in performance of speed and maneuverability, compares favorably with other airplanes of the same weight equipped with Liberty motors, such as the DH. But the deeper metal body and the unit construction give it a strength and rigidity which should greatly increase the safety of the crew in case of accident. In the sand test, conducted by the Air Service at Dayton, this body stood up without failure, to a load of three or four times what is customarily applied.

In addition to the metal covering of the entire hull and body, the interior construction of the wings is largely metal, duralumin being the chief material used.

One of the most interesting features of the machine is the use of the Inverted Liberty Motor. This development places the bulk of the engine cylinders, etc., below the line of thrust of the propeller, so that clearance for the propeller is more readily obtained, and at the same time, the center of gravity of the weight is lowered several feet.

The Loening Amphibian weighs 3,300 pounds empty and 4,900 pounds loaded. It has seats for a crew of three and a gas capacity of 140 gallons sufficient for a non-stop flight of 700 miles. A greatly increased gas capacity may be installed as as there is ample room in the deep body.

An interesting feature of the machine is that the

forward projection of the boat shaped body protects the propeller if landings have to be made in thick wheat fields or bushes, and preventing the machine from so readily turning over on its nose, when hitting obstacles. This is also considered a greatly added safety feature in the design.

The new machine was built by the Loening Aeronautical Engineering Corporation at its new factory in New York City. The Company has built planes for the Government for many years. Grover Loening, the inventor, was originally assistant to Orville Wright and later became Chief Aeronautical Engineer of the Army Air Service.

(See Photographs on Page 14)

British DeHaviland Plane to Accommodate Fourteen Passengers

British aeronautical publications give some details of a new commercial airplane now under construction at the DeHaviland Aircraft Company's works at Stag Lane Aerodrome, Edgeware, for the British Air Ministry.

This machine, which is known as the DH 54, is a normal tractor biplane fitted with a 650 h.p. Rolls-Royce "Condor" engine, following the usual DeHaviland practice.

Accommodation is provided for 14 passengers in a large, light and airy cabin. The height of the cabin is ample for even the tallest man to stand upright, and the gangway is of sufficient width to allow free movement for the whole length of the cabin. Separate arm chairs for passengers are arranged three abreast, all facing forward, and each passenger has a wide field of view through safety glass windows. Special attention has been paid to the provision of adequate ventilation and heating arrangements.

The pilot and navigator are located forward of the main planes, and both have an excellent and uninterrupted view. Luggage is carried in a large hold located under the pilot's and navigator's cockpit, which is entirely separate from the cabin.

The DH-54 will be fitted with the DeHaviland automatic variable wing camber device, which enables aircraft to "take off" after a shorter run and reduces the length of run on landing by reason of the low flying speed when throttled down which it imparts to the machine to which it is fitted.

The fuselage is built on the usual DeHaviland rigid system of construction eliminating all bracing wires and insuring longevity and accuracy. To facilitate storage or packing, it is built in two halves which are secured together by bolts. A novel feature is the oleo-rubber in compression undercarriage, which—in the case of an unavoidable forced descent in water—can be jettisoned. Dropping the undercarriage in this emergency reduces to a minimum the risk of overturning on alighting, while the machine is so constructed that it will float for several hours without submerging.

The main dimensions of this airplane are as follows: Span, 68 feet; length, 51 feet; height, 16 feet; weight fully loaded, 11,000 pounds; top speed, 110 miles per hour; cruising speed, 100 miles per hour; landing speed, 52 miles per hour; range, 4½ hours.

The Work of the San Antonio Air Intermediate Depot

The Engineering Department of the San Antonio Air Intermediate Depot, Kelly Field, Texas, under the direction of Lieut. Clements McMullen, completely overhauled and repaired during the month of December, 1924, 37 airplanes and 70 engines, as follows: Airplanes—8 DH-4's, 1 DH-4B-3, 9 DH-4M's, 7 JN6H-1's, 7 SE-5E's, 1 TA-6 and 1 TW-3; Engines—44 Liberty-A's, 11 Wright-E's, 13 Wright-L's and 2 Wright-A-2's.

During the calendar year 1924 there were overhauled and repaired at the San Antonio Depot a total of 363 airplanes and 701 engines, as follows: Airplanes—141 DH-4B, 11 DH-4B-1, 7 DH-4B-3, 2 GA-1, 70 JN6H-1, 5 DH-4B-P-1, 16 JN-6H-A-2, 5 JN-6H-E, 19 SE-5E, 27 MB-3A, 15 MB-3M, 36 DH-4M-1, 3 NBS-1, 1 TA-6, 1 DH-4B-4, 2 TW-3, 1 VE-9, 1 CO-4; Engines—359 Liberty-A, 72 Wright-A-2, 138 Wright-1, 81 Wright-E, 27 Wright-H, 20 Wright-H-3, 4 Lawrence-L-4.

Another Landing Field Established in Hawaii

According to a recent issue of the Honolulu *Star-Bulletin*, the plantation town of Hawi in Kohala, showing a spirit of progress and a realization of the role the airplane is destined to play in inter-island traffic, has just completed a landing field on land given by the Hawi Mill and Plantation Company, and is anxiously waiting for the arrival of the first airplane.

The field is about ten acres in size, being 400 feet wide and 1,200 feet long. Leslie Wishard, manager of Union Mill Company, who was an instructor in the aviation corps during the war, says that so far as he knows the Hawi field is the best on the island, and the officers from Luke Field, who were recently in the district, were very much pleased with the field and its situation.

Hawi is the first landing place between Hana and Hilo, and the new field is expected to do much to relieve the anxiety felt by pilots who fear trouble while crossing the channel between Maui and Hawaii. With an airdrome awaiting them at Hawi, they will be able to slip in to safety, make whatever adjustments or repairs are necessary, and continue on their way.

Australian Air Force Officer Inspects Selfridge Field

Wing Commander Richard Williams, of the Australian Air Force, recently paid a visit to Selfridge Field, Mt. Clemens, Michigan. Commander Williams, with round and speculative eyes, gazed and admired the wonders of the Air Service and the First Pursuit Group (such as it is). He unofficially inspected hangars and equipment and was much impressed with the new Curtiss Pursuit ships, type PW-8, which he said are very similar to those now used in his department.

A New Cuff-Valve Engine Introduced by Pitcairn Firm

PRACTICAL solution of the major portion of the motorists' carbon and engine knock troubles as well as the introduction of a more efficient type of gasoline engine is forecast in the introduction of the Howard-Brewer Cuff Valve Engine to the market.

Automobile interests have been casting about for several years for a new type of motor or valve gear commanding larger power with a more economical operating cost than the present poppet valve type is able to deliver. From the inquiries received by the owners of the patents it is evident that the new cuff valve engine is a long step forward in the proper direction if not the final reduction of the gasoline motor to its simplest phase.

The aviation rights of the Howard-Brewer valve mechanism have been acquired already by Harold F. Pitcairn, Philadelphia's leading factor in commercial aviation. Work is now under way converting a standard aviation engine to the new system under the technical direction of Captain R. W. A. Brewer, internationally famous automotive engineer, at the Aeronautical Research Laboratories, a subsidiary of the Engineers Development Company, Incorporated, of which Captain Brewer is President.

Captain Brewer was engaged some years ago to report on the possibilities of the cuff valve system by a London group of financiers and has followed subsequent developments closely.

He is satisfied that the Howard idea has great potentialities and has made several adaptations of it for replacements or conversions of valve system on all stock engines including a Ford.

The automobile world has for years been looking for a means of combating the results of high temperature in the engine and has turned to high priced special steels and fuel dopes to meet this object with only limited results.

This valve gear which is new to America goes to the source of the trouble and eliminates it at one sweep and by improved design and adopting the Howard system, the power of engines has been largely increased and the troubles from heat and dirt entirely eliminated.

Tips & Smith Acquire Important License

A recent telegram from Tips & Smith, Houston, Texas, announces that this flourishing firm has acquired sole license to convert Rotary Engines to Radial Type with the use of the quick change design for which patents have been applied for.

Engines so converted under this license are now being block tested and are reported to be performing satisfactorily in flight tests.

The converted Rotary engines are said to develop 110 horse power at 1500 R.P.M., and weigh less than 300 pounds.

As soon as tests are completed the engines will be placed upon a commercial production basis. This program will be rushed on account of the scarcity of suitable small engines for present commercial airplane owners.

Landing Field at Decatur, Georgia

Decatur, Georgia, now has an aviation field which ranks among the finest in that part of the country, according to a recent issue of the Atlanta *Constitution*. Two Decatur citizens, E. F. Tuggle and Frank Wickersham, both engaged in the automobile business, have furnished the field and put it in condition. Both have planes of their own and it was, of course, primarily for their own convenience that they planned the field, but they have offered its use freely and gladly to all visiting aviators and, if needed, to the city itself as an aviation field. Both of these men are enthusiastic flyers and spend all the time they can spare from business soaring high above their home city in their own planes.

The field which these two airmen prepared is about 75 acres in extent. It has two take-offs, one running north and south and the other east and west. Each runway is about 1,200 feet long, and both are as smooth and perfect as they can be. Scrapers, drags, and heavy rollers were used to make them wide, straight and smooth. The field is exactly one mile northeast of the Court House Square in Decatur. At the end of the field is a wooden hangar where the two machines (Curtiss biplanes) are housed.

There is a considerable drop at the hopping off end of the field which aids the flyer in getting into the air. There is ample space in the neighborhood of the field if a flyer should miss his bearings, but the field is so well marked that there is no excuse for any flyer who does not come down smoothly and in the right place.

For the convenience of visiting aviators who may land at the field unexpectedly, there is a telephone connection provided at the southwest end of the field, and just one mile away in Decatur there is always an ample supply of high test gasoline suitable for use in aviation motors.

The Joys of Service at Selfridge Field

" . . . . . A place where one may know the joys and sorrows of the frozen North; the tropic lethargy of Polynesian Islands; where in the quiet of an early morning one may grin as a duck comes tumbling down or feel chagrined at a clumsy miss; where one may feel the exultation that comes only with the sight of a well filled trap; where one may swim in soft blue water or ride its surface in motor boat and canoe, above fish that have no enemies and beg for your hook and a place on your table; where in the winter all the sports of St. Moritz are yours for the asking, skating galore and ice-boating that brings a thrill equalled, when one skims over the ice with the speed of a comet, by nothing else in the world; where the whole year through every sport is played and fought in season. Hark ye well and envy."

Statistics of Foreign Commercial Aviation

By Lieutenant J. P. Van Zandt, A. S.

EDITOR'S NOTE: The following comparative data has been submitted to the Chief of Air Service and the Assistant Secretary of War by Lieutenant J. P. Van Zandt, A. S., who recently returned from studying commercial aviation abroad. The author traveled more than 6,000 miles by air over Europe in conducting his investigations.

In the five years, from 1919 to 1923, inclusive, European air lines have covered 13,015,800 miles—equivalent to 520 complete circuits of the world at the equator—and have transported 115,225 passengers, 1,400,000 pounds of mail and 7,600,000 pounds of goods. It is estimated that during 1924 an additional 4,800,000 miles will be flown on regular air schedules and over 50,000 passengers transported.

Air transportation lines are in regular operation in England, France, Switzerland, Hungary, Roumania, Poland, Germany, Holland, Belgium, Denmark, and other European countries. Governments are showing great interest in developing commercial aeronautics and contributing liberally to its support and encouragement, in spite of the serious financial difficulties which many of the Continental nations have been facing during the years since the war.

From Africa to Finland by Air

Passengers may be booked by air, through any of the regular travel agencies, from London via Paris and Vienna to Constantinople, or via Berlin to Moscow, Russia, or Helsingfors, Finland; from Paris to Copenhagen, Denmark; from Toulouse, France, to Casabianca, Morocco, in northern Africa; and on a score of other routes.

The volume of passenger traffic is increasing every year, more than 1,000 passengers a week leaving London by air for the Continent during certain seasons of the summer. The majority of these passengers out of London are American tourists and it is estimated that over 35,000 Americans visiting Europe have thus avoided crossing the channel by boat.

Germans and Dutch appear to take up air travel most naturally and readily, then the English and finally the French. In Germany travel by air is not considered to be any more hazardous than by rail and the ordinary life insurance policies apply without distinction to both forms of transportation.

Valuable Goods Safer by Air

The records of European commercial air services indicate that financial matters, merchandise and freight of all kinds may often be transported by air with greater safety from loss or damage than by the usual channels of boat or rail. The insurance rates, for example, for all risks including theft, on articles, such as dresses, furs, jewelry, fragile goods, light machinery, etc., between London and Paris or Amsterdam are several times less by air than by boat and rail. Much gold bar and silver are shipped across the channel by air, one plane alone having carried $2,000,000 worth.

The principal investors in the national air lines of Germany, Holland, England and France, are the leading industrial, shipping, banking and forwarding organizations of Europe. They are convinced that air transportation is destined to fill an important role in the economic life of the Continent. In this respect the European public is much more awake to the significance of aviation, both as an element of national defense and as a transportation agent, than is the American public.

Government Subsidies to Air Lines

In England the British Government has created an air monopoly, known as the "Imperial Airways Limited," and voted a subsidy of 1,000,000 pounds sterling, covering operations for the next ten years. In Holland an advance without interest amounting to $500,000 has been made to the "Royal Dutch Air Service" to aid the national Dutch air line during the next four years; while France has voted an annual subsidy of 41,422,000 francs for its commercial services during the year 1924.

In addition to the direct subsidy grants, considerable indirect Government support is offered to promote the growth of commercial aeronautics by the establishment of large airports at the principal cities, at which Government erected hangars and other facilities are rented to the operating companies for a nominal sum; by the free use of Government radio communications, by the development of technical appliances for commercial aviation, and in a number of other ways. In several instances municipal airports have been created at the expense of the cities as at Konigsberg, Danzig, and Rotterdam. Berlin has a big municipal landing field under preparation at Tempelhofer Feld, which may be reached from the center of the city by street car in less than twenty minutes.

European nations are faced with a fundamental political difficulty in the development of air lines. In Europe the principal lanes of business exchange in almost every instance involve flight over several countries. The United States, on the other hand is probably better suited politically to the establishment of self-supporting air lines than any other country in the world, by reason of its geographical extent, freedom from custom restrictions, common national interests and homogeneous business methods.

Air transportation under suitable conditions may be conducted in the United States with a degree of safety, regularity and dispatch sufficient to establish it as an important additional channel of commerce in the transportation resources of the nation.

Air transportation has now passed the experimental stage, as may be seen in the amount of operating experience accumulated since the war. The aggregate number of air transport miles flown during the five years 1919-1923 is 20,110,700 miles. It is estimated that this will be increased during the present year, 1924, by 8,500,000 miles. The de-

velopment of this operating experience, per year, is as follows:

1919	1,085,066	miles
1920	2,204,128	"
1921	4,260,034	"
1922	5,450,989	"
1923	7,028,625	"

These figures exclude all military flying and all local or special flights; they represent only regular air transportation services over regular routes throughout the world; for which reliable statistics are available, carrying passengers, mail or commodities.

Air Traffic Experience

As the preceding figures are an impressive measure of the accumulated amount of operating experience in air transportation, so the following statistics indicate the present traffic experience:

Development of Passenger Air Traffic

1919	2,585	passengers
1920	8,797	"
1921	24,224	"
1922	33,206	"
1923	52,684	"
1924	62,000	(estimate)

In the first five years a total of 121,496 passengers have been transported by air lines throughout the world.

The air mail traffic has been developed most intensely in America, where the mail carried by the Post Office Department Air Mail Service between New York and San Francisco represents the major portion of the aggregate traffic figures. In 1922 a total of 1,930,177 pounds of mail was transported by air, of which 1,512,197 pounds were United States mail over the transcontinental route. In 1923 the European air mail from France to Morocco grew rapidly in volume and of the total 2,466,279 pounds carried that year, 752,009 pounds represents European air mail traffic. The aggregate mail load has been increasing steadily and totals 7,144,570 pounds for the five years 1919-1923, inclusive.

Development of Good Traffic

The recent rapid growth in the volume of air goods traffic as indicated in the following table is of special interest:

1919	269,600	pounds
1920	479,100	"
1921	876,000	"
1922	2,348,500	"
1923	4,235,142	"
1924	5,400,000	(estimate)

Business men are beginning to learn that they can depend on air transportation for the expedition of commodities of all kinds and regular consignments of auto parts, perfumery, silks, and a hundred other articles are to be found traveling on the European airways. The fact that insurance rates are actually less by air than by boat and rail for valuable goods sent between England and the Continent has played an important part in convincing business men of the merits of the new form of transportation.

The aggregate traffic experience of air transportation lines may be appreciated if the weight of passengers, mail and goods carried is consolidated in one figure: thus, if we allow 150 pounds per passenger as conservative figure, and include the estimates for the present year, 1924, the total traffic on the air lines for six years is: 51,277,310 pounds, or over 25,000 tons.

Passenger Safety

The safety of passengers may be observed by the record of the British and Dutch air lines during the three years from 1921 to 1923, inclusive. During that time, 7,990,000 passenger miles were flown; for two years no fatal accident occurred, while in 1923 there was one accident involving three deaths. Hence the passenger air miles per passenger fatality for this period is 2,663,300. A comparison of this with the record of railroad lines is of interest: The New York Central Railroad, according to the latest Accident Bulletin of the Interstate Commerce Commission, operated two billion eight hundred million passenger miles during the calendar year 1923, during which time 636 passengers were killed or injured, (this excludes accidents to employees, trespassers and all persons other than paying passengers). Hence the number of passenger-train miles per passenger casualty is 4,400,000. It will thus be seen that the safety record of the air lines is not far behind that of American railroads. And this has been possible in five years of development, whereas the railroads have eighty years of operation behind them.

Safety of Air Mail

It is hard to realize that mail sent by air actually is subject to less loss or destruction than registered packages sent by train. Yet that this is so the records show without a question: thus in the three years through 1923 the U. S. Post Office Air Mail Service carried 4,316,500 pounds of mail with a loss of only 230 pounds; this is five one-thousandths of one per cent. lost or destroyed. Compare this with the percentage of registered packages carried on United States trains during 1922 which were lost or destroyed, namely seven one-thousandths of one per cent. There is practically no theft hazard when valuable mail or goods are sent by air and this accounts in part for the lower insurance rates which are offered by European companies for goods shipped by air.

Air Mail More Regular Than Trains

It is a remarkable fact to find that the air mail

service between New York and Chicago has operated for the past two years with a higher number of its scheduled trips arriving on time at destination than the average for railroad trains. The air mail planes on an 11-hour schedule between New York and Chicago, that is at a ground speed of seventy miles per hour, have arrived on time 85.8 per cent of all their scheduled trips during the period from June 1921 to May 1923, inclusive. This may be compared with the per cent of scheduled trains in New York State arriving on time at division terminals during 1910-1920 inclusive, namely 81.0 per cent. The average train speed from Division to Division is between thirty and thirty-five miles per hour, or half that of the planes.

A comparison by seasons shows that during the winter both the trains and the air mail have their greatest number of delayed trips, the trains averaging only 75.3 per cent on time, the air mail 73.0 per cent. During the spring season they are both approximately 85 per cent, but in the summer and autumn the air service is a great deal freer from delayed arrival than the railroad service, arriving during the summer 97.8 per cent and during the autumn 86.6 per cent of all its scheduled trips on time.

* * * * * * *

It is the conclusion of the report that "under suitable conditions mail and goods may now be transported by air with equal or greater safety and reliability than by train and with a greater saving in time."

Major Zanni's Remarkable Flight

The Argentine aviator's progress on the first part of his world flight was very rapid. It was unfortunate that his Fokker C-IV plane should have been put out of action by so trivial an accident as that which occurred at Hanoi. This delayed the rest of his trip so long that he has been obliged to stay in Japan. Early this spring, we understand, he will attempt the next stage which will take him to Alaska. The details of Zanni's mishap are interesting. He was about to start off for Canton. The aerodrome had become water-logged by the torrential rains, and Zanni had hardly opened his throttle to taxi into position for starting when the machine sunk in an unusually bad patch of mud, the wheels sticking fast, and causing the machine to turn over. Neither Zanni nor Mechanic Beltrame were in any way injured, but the enforced delay is all the more to be deplored in view of the bad weather season which is fast approaching.

We have had several messages from Zanni since he left Amsterdam and all along we have been informed, not only by the fliers themselves, but also by independent experts at the different stopping places enroute, that both machine and engine have functioned in a manner worthy of the highest praise. It is not quite clear where the fliers spent some of their nights, but as far as we can ascertain their progress has been as follows:

July 26	Amsterdam-Paris.
July 27	Paris-Lyon.
July 28	Lyon-Rome.
July 29	Rome-Salonika.
July 30	Salonika-Constantinople.
July 31	Constantinople-Alleppo.
August 1	Alleppo-Bagdad-Basra.
August 2	Basra-Bendar Abbas-Karachi.
August 3	Karachi-Nasirabad.
August 4	Nasirabad-Allerhabad.
August 5	Allerhabad-Isri.
August 8	Isri-Calcutta. (New propeller fitted.)

Distance covered 5,752 miles in fourteen days. His time from Paris to Calcutta was only one day more than that of the Frenchman D'Oisy. It must be said that the splendid performance of the latter was materially helped by the excellent weather conditions on the first days of his flight, whereby he was enabled to make a non-stop flight from Paris to Bucharest, whereas bad weather forced Zanni down at Lyon and Rome.

August 14	Calcutta-Rangoon.	
August 15	Rangoon-Bangkok.	(7000 miles in
August 18	Bangkok-Hanoi.	22 days.)

Major Zanni has thus covered roughly 8,000 miles in twenty-four days. In comparing this flight with the efforts of the U. S. A. and English teams, it is noteworthy that the English expedition took forty-eight days to cover 5,300 miles, flying along the same route in better weather, while the U. S. A. fliers covered the same route, in the opposite direction, in thirty-two days.

As a direct result of the excellent performance of the Fokker C-IV the Argentine government has just placed an order for a third machine of this type, fitted with floats for long ocean flights.

Engine Displacement Feature Settled—At Last!

No doubt a good number of the boys who expect to enter planes this year in the civilian light plane events will be glad to get the news that the committee, after very careful deliberation, finally settled the engine limits for single seater light planes at 80 cubic inches. However, the committee did not feel that development had progressed far enough to place a limit on two-seater passenger light planes, although they passed a recommendation that 160 cubic inches would receive favorable consideration if the occasion demanded.

The Amsterdam-Batavia Flight Accomplished

The flight from Amsterdam to Batavia (Dutch Indies) with a Fokker, 10-passenger commercial air liner, type F-VII has been successfully concluded. Mr. Van der Hoop, the chief pilot, landed the machine at the aerodrome at Batavia at about 2 o'clock (East Indies time), on Monday, the 24th of November, 1924, thereby completing the long journey of 9,820 miles, which constitutes the most ambitious flight yet made with a purely commercial passenger aeroplane.

There have been many fine performances in long distance flying of late, but in each case the machines utilized have been of service type, adapted for the special purpose, and with a relatively high-powered engine. In comparison therefore, the exploit of the F-VII must be regarded in a different light.

It must be remembered that this actual F-VII had been employed on the regular air traffic work of the K. L. M. Company's air line between Amsterdam and London during the early summer, and was only withdrawn from the line for the purpose of installing the necessary extra tanks, etc., in order to make ready for the flight.

At the outset the flight was delayed by an unfortunate accident in Bulgaria, due to the breaking of a water-connection, the consequent forced-landing in impossible country resulting in damage to the undercarriage, etc. But the Dutchmen were not to be deterred, and as soon as the necessary repairs were finished they got under way again, and that their progress since then has been very good will be seen from the following:

October	1	Amsterdam-Prague	526 miles
October	2	Prague-Belgrad	572 miles
October	3	Belgrad-Plovdiv	378 miles
November	2	Plovdiv-Constantinople	249 miles
November	3	Constantinople-Angora	295 miles
November	5	Angora-Alleppo	510 miles
November	6	Alleppo-Bagdad	505 miles
November	7	Bagdad-Basra-Bushir	621 miles
November	8	Bushir-Bendar Abbas	432 miles
November	9	Bendar Abbas-Karachi	743 miles
November	10	Karachi-Ambala	940 miles
November	12	Ambala-Allerhabad	529 miles
November	13	Allerhabad-Calcutta	490 miles
November	14	Calcutta-Aykab	441 miles
November	15	Aykab-Rangoon	352 miles
November	17	Rangoon-Bangkok	491 miles
November	18	Bangkok-Sengora	538 miles
November	21	Sengora-Medan	350 miles
November	23	Medan-Muntok	621 miles
November	24	Muntok-BATAVIA	310 miles

Thus by making long daily flights the Dutch pilots have more than made up for the unfortunate delay at the outset.

All whose interest in the future of commercial aviation is serious, cannot but feel that this flight has done a great deal towards furthering the possibilities of regular long distance intercontinental air traffic.

The average speed worked out at 81 miles per hour; the Rolls-Royce "Eagle IX" consumed 2,260 gallons of gasoline and 132 gallons of oil; the total number of propellor revolutions was in the neighborhood of 17,000,000 while the crankshaft would have revolved some 26,680,000 times.

—*Fokker News Bulletin.*

Aerial Gunnery Training at Ellington Field

A flight of forty DH-4B airplanes, carrying the instructors, enlisted personnel and students of the 10th School Group, Kelly Field, Texas, took off on the morning of January 19, for Ellington Field, Houston, Texas, for two weeks of maneuvering and aerial gunnery. The flight was preceded on the 18th by seven Martin Bombers, carrying Captain R. C. Candee and an advance detachment and supplies for the temporary school.

The advance party went ahead of the main flight to prepare accommodations for the school. Arrangements were made for the use of the extensive range at Ellington in carrying out the prescribed course of gunnery of the advance school.

Stationary targets, cone targets towed by planes, and shadow targets on water will be used in the course. On completion of the gunnery course the school will return to Kelly Field.

Included in the detachment making the trip were thirty-five student officers and cadets, twenty-one permanent officers and seventy-five enlisted men. Martin Bombers were utilized to take supplies and equipment from Kelly Field.

The detachment was under the charge of Captain R. C. Candee, Air Service.

Paris Aero Show

The 1924 Paris Aero Show, although displaying no startling accomplishments in aircraft building since the last exhibition was well worth while and attracted thousands of visitors.

It is said the three best planes at the show are the Koolhoven, the Siskin, and the S. I. M. B. The Koolhoven is a Dutch ship using a combination wood and duralumin structure. The S. I. M. B., otherwise the Ferbois or Benard was designed by M. Hubert and recently put up the French Speed Record to nearly 279 miles per hour. The metal wing covering of the original design has been changed to ply-wood while the undercarriage has been made stronger by an additional strut. The Siskin V, put out by the Armstrong-Siddeley, an English firm, is quite an improvement over a former design entered in the 1923 King's Cup race and has a much better performance.

Lieutenant Clark Piles up Some Flying Time

During the calendar year 1924, Lieut. Ray H. Clark, stationed at Fort Bliss, El Paso, Texas, accumulated a total flying time of 528 hours and 15 minutes, leading the flying time of the Second Division, Air Service, for that year. Lieut. Milton J. Smith came in second on the list with a total time of 387 hours and 20 minutes.

1925 Aero Events Outlined

N. A. A. Contest Committee Settles Upon Important Subjects

ON January 29, the Contest Committee of the National Aeronautic Association, headed by B. Russell Shaw, met with representatives of the various government departments, aircraft trade organizations, and other interested parties for the purpose of discussing the general program of aircraft sports to be pursued in the United States during 1925.

Outside representatives as noted were called in to give the Contest Committee the benefit of their suggestions.

On January 13 the Contest Committee met to review various race regulations and to arrive at the location of various contests wherever possible.

The Pulitzer Trophy Race will be held between September 17 and October 3. As yet the location has not been decided but it is generally known that Minneapolis and St. Paul are making a strong bid for the 1925 air classic. The twin cities have awakened to the vast possibilities in aeronautical development and are anxious to have the International Air Races held there next fall. No doubt, such an event will draw well in this locality where aviation is just beginning to excite unusual popular interest.

National Elimination Balloon Race

The National Elimination Balloon Race will be held on May 1, at St. Joseph, Missouri. Regulations for this race are now ready for distribution. This race will be for the Litchfield Trophy and also will serve as an elimination contest to pick the team of three contestants to represent America in the first contest for the second Gordon Bennett Cup. This trophy replaces the original Gordon Bennett Cup won permanently by Belgium last year. The Gordon Bennett Balloon Race will be held at Brussels, Belgium on June 7.

Jacques Schneider Race

The Jacques Schneider Race will be held at Baltimore on a date yet to be determined. This date, however, will fall between October 24 and 31. Regulations for this contest remain the same as for 1924. Entries close April 1.

Pulitzer Race

The Pulitzer Trophy Race regulations remain the same as for 1924, with the exception that the controversy on wing model testing by foreign nation entries has been settled and these entries may now test their wing models in any approved wind tunnel in their respective countries, instead of sending them to M. I. T. for test, as required last year

In view of the fact that France has taken the world's high speed record from this country, it appears obvious that they will send their first fast planes to America to compete for the Pulitzer Trophy this year. Although it is doubtful if their present planes can meet the landing speed requirements, authoritative information indicates that the French are making preparations to install larger wings and otherwise refine their speed planes. Thus, the Pulitzer race should prove a bit more popular this year and settle any sundry storms of conscientiousness suffered by our eastern contemporary, Mr. Gardner, in billing the event as an "International" Air Race.

Incidentally, this being an international competition it is necessary to close all entries for the Pulitzer Race by April 1.

A. E. A. Resume Meetings

The Aeronautic Executives' Association will resume their monthly meetings within the next few weeks, according to a statement issued by R. R. Blythe, chairman.

The monthly luncheons will continue to be held, as in the past, at the Cafe Boulevard, 41 steps off Broadway on 41st street. At each meeting there will be present a prominent speaker on aeronautics of interest to all.

Among those who have addressed the Aeronautic Executives are: R. E. M. Cowie, President of the American Railway Express Company; Congressman F. H. LaGuardia; Colonel Paul Henderson, Assistant Postmaster General; Admiral W. F. Fullam; Grover C. Loening, of the Loening Aeronautical Engineering Corporation; Colonel Frank Searle, of the Daimler-Hire London-to-Paris Airline, and many others.

The purpose of these gatherings is to promote good fellowship and understanding between the executives of the aircraft industry; to invite free discussion on aircraft topics and to aid in every way the development of commercial aviation. There are no dues and the membership is made up of aviation executives, engineers, designers, and business men who are interested in aeronautics.

World Cruisers Still at McCook

Two of the World Cruisers—the *New Orleans* piloted by Lieutenant Erik Nelson and the flagship *Chicago* piloted by Lieutenant Lowell H. Smith still remain in the hangars at McCook Field awaiting final disposition through orders from the Chief of Air Service. The *Boston II* is at Bolling Field, Washington, D. C., but will no doubt soon be flown back to the Dayton field, where it will be used in making navigation test flights. The *Boston II* was Lieutenant Wade's ship, the second supplied him as the result of an untimely damage to the original Cruiser in the north Atlantic.

Pioneer Aeronaut Visits Rockwell Field

Mr. Frank L. Lahm, Vice President of the Federation Aeronautique Internationale, with headquarters at Paris, France, and father of Col. Frank P. Lahm, Air Officer of the Ninth Corps Area, two of the most notable figures in the history of American Aviation, were recent visitors at Rockwell Field, and other Air Service Stations.

The elder Mr. Lahm has resided in France forty-four years, twenty of which he has represented the United States in the F. A. I., the supreme governing body of civil aviation in the twenty-five nations signatory to the Association.

Mr. Lahm senior, taught Colonel Lahm how to pilot a balloon. How many years ago this happened may be judged by the fact that Colonel Lahm holds spherical balloon license No. 3, dirigible pilot's license No. 2 and aviator's certificate No. 2. Both father and son made flights with the Wright Brothers in the pioneer days of heavier-than-air craft, the elder Lahm with Orville and Wilbur Wright in France and Colonel Lahm at Fort Myer, Va.

World Flight Commander Returns to Rockwell Field

Captain Lowell H. Smith, world flight commander, reported for duty at his regular station, Rockwell Air Intermediate Depot, Coronado, California, on January 5. He was granted a short leave of absence which he intends to spend at San Diego and with his parents in Los Angeles. The magnificient automobile presented to Captain Smith by the city of Chicago, which was shipped to Rockwell Field, is now being used by the famous airman.

Lieutenant John Harding, Jr., who accompanied Lieutenant Erik Nelson, pilot of the New Orleans, as mechanic, will start on a lecture tour in March under the management of the Albers Association of Cleveland.

America Loses 1,000 Kilometer Speed Record

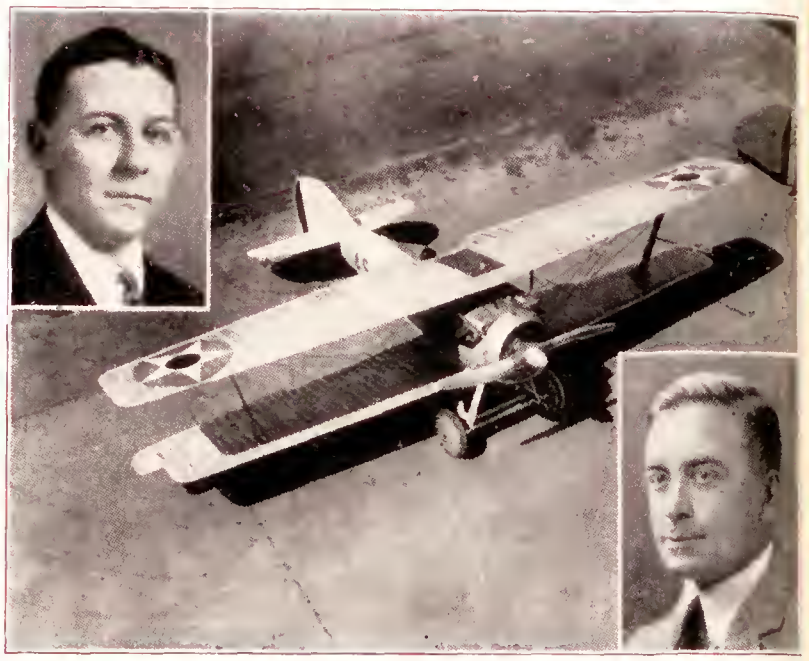
It is reported that the French pilot, M. Doret, in a recent flight over the Villesauvage-La Marmogne circuit, covered 1,000 kilometers (630 miles) in 4 hours, 30 minutes, 32⅘ seconds or at an average speed of 221.7 kilometers per hour (137.5 miles per hour). The previous world's record for speed for this distance is held by Lieut. H. R. Harris and R. L. Lockwood, Army Air Service—205 kilometers per hour (127 miles per hour) made at McCook Field, Dayton, Ohio, March 29, 1923.

Swedish Aviator Visits Langley Field

The 20th Squadron at Langley Field, Virginia, recently had the pleasure of demonstrating to Lieutenant Stromme of the Swedish Air Service, the Martin Bomber type airplane. Lieutenant Stromme, who is on a short visit to this country, appeared to be highly enthused over the manner in which the activities at Langley Field are conducted.

Buhl-Verville Airplane Co. Organized

The Buhl-Verville Airplane Company is the name given a new firm soon to start operation in Detroit. It will be headed by Lawrence D. Buhl, president of the Buhl Stamping Company. Mr. Verville becomes second vice-president and chief engineer. The other officers are: Neil C. McMath, now general manager and research engineer of the Canadian plant of the Buhl



A photograph of the "pursuit" ship will be constructed by the Buhl-Verville Airplane Co., whose organization was recently announced. In the upper left-hand corner is Lawrence D. Buhl, president of the Buhl Stamping Co., who will be president of the company, while in the lower right-hand corner is Alfred V. Verville, internationally-known designer of fast airplanes, who will be second vice-president and chief engineer of the newly-organized company.

Stamping Company, who will be vice-president and general manager of the airplane company; and H. P. Smith, secretary and treasurer of the Buhl Stamping Company will assume the same title with the aircraft company, Arthur H. Buhl will serve as a director.

Until the formation of the new company, Verville has been chief of the pursuit and racing airplane design section of the Army Air Service at McCook Field, Dayton. He designed the Verville-Packard racer which won the Pulitzer high-speed race in 1921, flying at 186 miles per hour—an unheard-of speed at that time. He was also the designer of the Verville-Sperry racer which won the Pulitzer race at Dayton last October. This plane now holds the Pulitzer Trophy.

Verville is also the designer of the famous Sperry messenger, a tiny plane which has been launched time and again from dirigibles while in flight. His VCP-1 which to date is the best performing fighting plane above 15,000 feet with an engine not supercharged, carries two men and two machine guns with two hours' fuel. It has a ceiling or maximum altitude of 27,000 feet and a high speed at 20,000 feet of 155 miles per hour.

Verville will head a corps of engineers at the new plant and will proceed with the preliminary design of a high-speed plane which is expected to exceed anything now built in speed, maneuverability and value to military air forces. Later the company plans to enter the commercial field.

Verville was born in Atlantic, Michigan, and gained most of his early experience in airplane design and construction in Detroit.

Flying Activities in Hawaii

During the month of December the Fifth Composite Group in Hawaii flew a total of 152 hours and covered 8,038 man miles. The number of ships in commission averaged 97.2%.

A Gordon Bennett Balloon Race This Year

According to the British Aeronautical Journal *Flight*, a second Gordon Bennett Cup for balloons has been definitely decided upon by the Belgian Aero Club, and will be competed for on June 7, starting at Brussels.

Shenandoah and Army Airplanes Get Eclipse Photos

That the value to science of employing aircraft to aid astronomers in their work was exemplified during the sensational period of the recent total solar eclipse which visited sections of the more thickly populated districts of eastern United States on January 24.

Equipped with both standard and double cameras for taking both still and moving pictures of this phenomena a party of eight astronomers and photographers from the Naval Observatory, Washington, D. C., went aloft in the "Shenandoah" and obtained what are said to be some of the most valuable eclipse photos and other data known to science.

The airship took in a section of totality representing a strip seventy miles in width and including most the whole of Long Island, with sections of Rhode Island and Connecticut.

The Army Air Service contributed equally in this interesting work when directed by the venerable Amherst astronomical authority, Dr. David Todd, a party of Army Air Service officers, with other interested observers secured more than 100 photographs.

Twenty-five planes took part in these observations, many of them secured from a height of three miles above the earth.

Captain F. W. Flickenger was in charge of the ground work during these observations, while Lieutenant G. W. Goddard, chief of the Photographic Section, McCook Field, with Dr. S. M. Burka, civilian photographic expert, from this same post, took a major part in the aerial work.

In view of the fact that photographs of the solar eclipse are not usually striking in the eyes of the layman, we have thought best not to offer any of a number which this magazine has on hand. However, Doctor Burka has promised to submit us a complete and authoritative explanation of the observations within the near future and we hope to publish this review shortly, along with explanatory photos taken during the observations.

World Flyers Get Collier Trophy

The Collier Trophy Committee, meeting at the N. A. A. headquarters on January 16, reviewed the claims submitted for the 1924 Collier Trophy award and after due deliberation awarded the trophy to the "U. S. Army Air Service for having accomplished the first aerial flight around the world."

The 1924 Collier Trophy Committee consisted of Orville Wright, chairman; Godfrey L. Cabot, G. W. Lewis, Porter H. Adams and B. Russell Shaw. The outline of former awards was given in a previous issue of "Slipstream."

Reenlistments in the Air Service

That the Air Service is a popular branch of the service among enlisted men may be gathered from the following submitted to us by a Correspondent from the Second Division Air Service, Fort Bliss, El Paso, Texas:

"The men of the Second Division Air Service are satisfied with their unit and station as is proved by the number of reenlistments. Of the last thirteen men discharged, eight have reenlisted. Of the next fourteen men due for discharge, nine are quite sure of reenlisting, and possibly two others of these fourteen will remain. We believe this record is ahead of that of any other organization in the Army, at least we can recall no instance of such a large percentage of reenlistments for the same organization.

Flying at Kelly Field

Considerable flying has been done at Kelly Field during the last two months. A large number of enlisted men living within the 500 miles radius were taken on cross-country trips to their homes for Christmas and New Year. Exceptionally good weather is being made use of by the present class in the Advanced Flying School for cross-country flying. About twenty students a day are making cross-country flights. During the month of December, 34,183 cross-country miles were flown in the 10th School Group. The flying time for the month of December for the 10th School Group was 1,673 hours, comprising 6,701 flights of which 172 were on cross-country.

Another Altitude Record Smashed

The popular outdoor sport indulged in by aviators of different countries of snatching aviation records away from each other still goes merrily on. We noticed a report to the effect that the Italian aviator Signor Botalla recently created at Turin a new record, carrying 1,500 kilogrammes (3,300 pounds) by attaining an altitude of 17,500 feet, the flight lasting 1 hour, 50 minutes, 52⅘ seconds.

The former record for altitude carrying this load is held by the French pilot, Lucien Bossoutrot, who on May 8, 1924, reached an altitude of 4,475 meters (14,682 feet) in a Goliath Farman airplane.

Navy to Complete Aircraft Carriers

Director Lord of the Government Budget Bureau on February 13, presented to the Congress, Budget proposals to carry out extensive naval construction and other work already approved.

The budget proposal specified that $1,000,000 of the total of $30,000,000 appropriated would be made available at once for work on the battleship "Florida." Two million dollars additional to be set aside for starting work on the first two of the eight 10,000-ton post treaty cruisers and another similar amount for construction work on six new gun boats.

The new cruisers will cost approximately $16,500,000.

Another item of $14,000,000 is called for to complete work on the naval aircraft carrier "Saratoga" and "Lexington," which are being converted from battle cruisers. Three million dollars will be asked for the purchase of new aircraft.

The new aircraft carriers will each carry seventy planes and the latter appropriation figure is for the purpose of providing the planes necessary to equip the two carriers when they are commissioned for service with the fleet.

Continued from page 6

firm. Of course everybody connected with aviation remembers Wm. B. Stout who has given the firm a name. His newly designed all metal "Air Pullman" built entirely of neatly fashioned corrugated sheet dualuminum has caused the lay element to open their eyes at the sight of the pretentious cabin fitted with all the conveniences of the modern pullman car. Many believe the Air Pullman is the entering wedge to all-metal construction in airplane building, and incidentally to safe and comfortable air travel. There is an exception in C. G. Grey, editor of the *Aeroplane*, London, England, who thinks it foolish to use metal when wood answered the purpose better. Mr. Grey cites as an illustration that our own bodies would be ensconced in a bone covering if our Maker did not decide that we could battle the rough old world with more pliable material.

The comparison is, of course, merely one of Mr. Grey's far-fetched bits of English humor and so we will give the all metal Pullman a better place along side of the all metal railroad coach which has replaced the wooden ones. *Slipstream*, of course, should not be assumed as advocating all-metal construction.

It is the hope of the Stout firm to build a number of the Air Pullmans for commercial airline service between the larger cities. The Air Pullman has made several trips between Dayton and Detroit, carrying a number of passengers, who smoked good cigars and chatted with utter complacency among each other about the scenery enroute.

(To be continued in March issue.)

The Virginia Capes Bombing Test

Speech Delivered by General William Mitchell (McCook Field Auditorium)

EDITOR'S NOTE—*As a result of the recent General Mitchell stir in Washington a good deal of attention has been directed to the important bombing tests of airplane against German war vessel targets off the Virginia Capes in* 1921.

It was General Mitchell who commanded the air forces during these tests and in his recent testimony before the House Aircraft Committee he has repeatedly referred to these demonstrations as positive proof that the war vessel is doomed before the attack of aerial bombs dropped from airplanes.

General Mitchell has been criticised for publishing articles concerning these tests in which he points out that the Navy tried in every way to belittle the effectiveness of the aerial bombs, and to restrain all press reports relative to the tests.

We feel that in view of the importance attached to these tests the readers of SLIPSTREAM will be glad to get General Mitchell's own story of what took place there.

The following account of the tests against the captured German war vessels as related by General Mitchell before a group of McCook Field Engineers affords an intimate review of the entire bombing program and otherwise points out the fiery enthusiasm with which General Mitchell regards the success of the airplane attacks.

AS you all know, aviation first took its place as a military weapon in Europe—that is, it was first used effectively over the land, along the front and the sea coast. In the first place, the principal difficulty was keeping the airplanes in commission; in the second place, no equipment was developed except in a very rudimentary way; and in the third place, we did not have time to develop armament for attack with large ships. In addition to that, the British kept their fleet very well concealed at a minimum distance of five hundred and fifty miles from the German coast. It was over an eleven hundred mile trip to get there and back, and they had no ships developed which would cover the distance at that time except Zeppelins, and they were not handled in an aggressive manner, principally because they had really been developed for reconnoissance work. Had they known as much about Zeppelins then as we do now, history might record a different tale.

We started out by Colonel Milling and myself working on this problem of the attack of sea craft. There were several things which had to be taken into consideration—what ammunition we could get, whether we could get at the ships, and, if we could get at them, whether to strike from the inside out or the outside in.

The problem of attack of seacraft was never difficult. If we got them within the limit of our radius of action, we would have no trouble in attacking. We have had a great deal of experience with defense against aircraft from the ground. We have learned a great many things about anti-aircraft from the English, French and Germans indiscriminately, so that we know a great deal about the limitation of anti-aircraft. *From a moving object, such as a ship, it is almost impossible to hit anything in the air.*

We had several weapons we could choose from—mines, gas, flaming projectiles such as phosphorous, torpedoes and bombs. The question was which one of these it was best to use. The only thing we had on hand which we could develop readily was bombs, and we had a great store of bombs available. However, these bombs had a great many deficiencies, particularly in the fuses. The fuse is the hardest thing about a bomb to make. We have never had good fuses in this country. We have never used any of our own fuses on the front even with artillery, so that

A direct hit of aerial bomb on battleship.

it was a great problem whether we could get our bombs to explode properly in water.

We found the best place to attack was from underneath. Ships had been developed to resist attack from the same plane, from overhead, and third, for resistance of attack just below the water line; that is, from torpedoes; but in order to defend them from attack from underneath, ships would have to be made so heavy that they could not carry any armament or machinery to amount to anything. Even though they were designed for protection in that respect, we could blow them out of the water so that they have no chance at all against bomb explosions.

The great advantage about bombs is that they carry fifty per cent of their total weight in explosive. A torpedo costs twenty or thirty times as much and only carries twenty per cent in explosive and has to be dropped in a horizontal plane. An artillery projectile only carries five per cent of its weight in explosive and is very limited in its range.

AFTER trying hundreds of bombs we came to the conclusion that a fuse with a delay of about a second in the nose, and a twentieth of a second in the tail was the best fuse, and that gave us fifty to eighty feet under water, as near as we could determine.

Those bombs sent off fragments with an initial velocity of six thousand feet per second—twice as much as ordinary rifle bullets—and at that depth they break the water all around. Ships anchored two or three miles away were affected by the explosions. These bombs are a most awful weapon against anything that floats on the surface of the water.

After we had thought about these bombs, the next thing was to get something to carry them, and the minute I saw that we had those Martin Bombers last year I knew we were ready. That was when I went back and told the Committee what could be done. I was absolutely certain of it—just as certain as I could be without having tried it. *I tried for two years to get a target, but under these new conditions they had to give it to us.*

The program was arranged with the seacraft seventy-five to one hundred miles off coast. *Of course, we didn't think it was necessary to put them that far off but, in the deepest water, bombs had the least effect; consequently, less total force of the bomb would be felt.* The ships that were attacked consisted of a submarine and destroyer, a protected cruiser, and a battleship. Of course the destroyer and the submarine were perfectly easy to sink with light bombs.

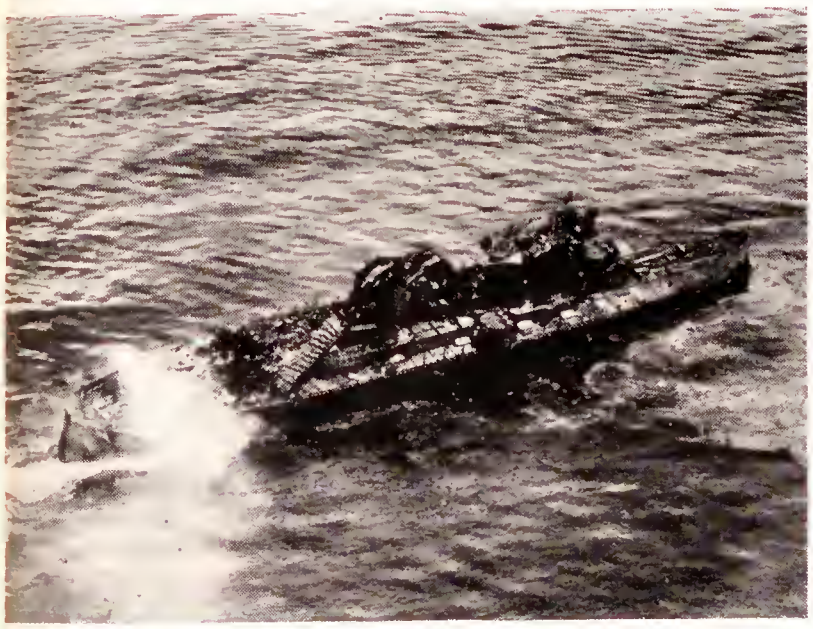
The cruiser was more difficult and the battleship, one of the strongest that exists today— the *Ostfriesland*—

was developed for work on the North Sea and had splendid protection against torpedo attack and against mine attack. Her compartments were solid across the side and also along the ship. No ship in service today is any better protected or even as well. She was in first-class condition. Those were the targets which were given us.

Remember that we only applied in these exercises one kind of projectile—an explosive bomb. *We were allowed to drop only a certain number of these and we had to stop on signal.* First we began bombing training all over the country with small bombs. Then we assembled a force at Langley Field and began bombing objects on the land, then near the water, then on the water, beginning from the shore and gradually working out, so that we could tell within a very close percentage of the amount of hits we would be able to make under certain conditions and we were pretty certain of success.

The organization that we developed at Langley Field was the best that I have ever seen. That 14th Squadron was the finest of its kind I have ever seen anywhere. The equipment was splendid, and the personnel absolutely wonderful.

By the time a bomb has fallen about twelve hundred feet, it is falling at an angle of seventy-five degrees and from that time until it falls clear down to the end it has only increased its angle about six or seven degrees, so that at twelve hundred feet you have pretty nearly a vertical fall. With all other projectiles we can not tell what



Aspect of battleship after an aerial bombing attack. Such pictures would appear to reiterate General Mitchell's views but the Navy says that the ocean vessels had no opportunity to fight back.

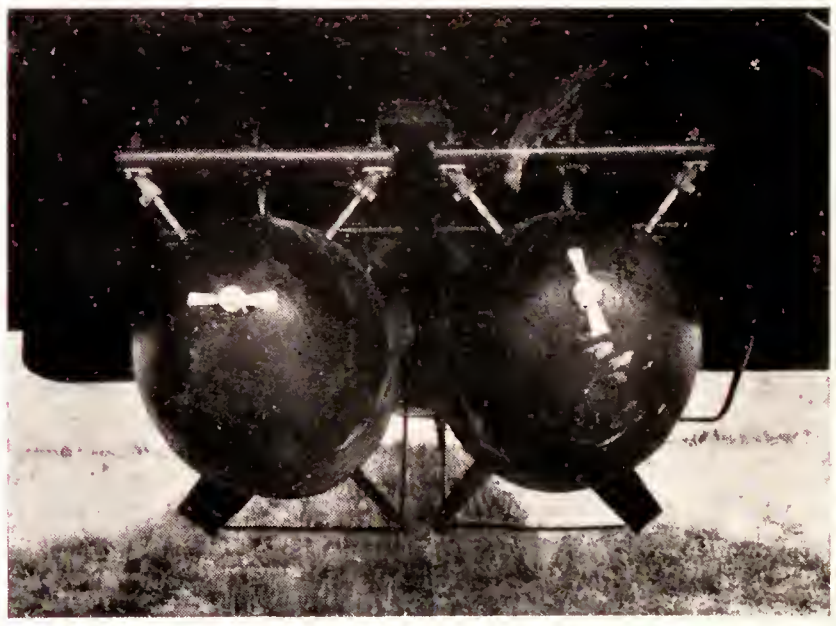
they are going to do. They act in all sorts of ways. The surface of the water is disturbed by waves, and furthermore, the shape of the nose of the projectiles cause them to ricochet when they strike. However, with the vertical fall that we get with these bombs, the streamline form, etc., we get very even penetration of the water. I might say of these bombs also, they have four pieces of solid steel in their nose, that they were developed to go through the small decks above the protected deck. They will not pierce the protected deck but will go through the whole superstructure over it. You can never pierce the protected deck with light bombs but you can put the ship out of commission. You could increase the velocity so as to pierce them by getting a succession of impulses, but it has not been necessary to do so to date. We pierce inward from outside so it is easy to kill the personnel and bury them. Our velocity is about maximum at sixty-two hundred feet and at about that height hits very good. We had a velocity of about five hundred and eighty feet a second, sufficient to burst the bomb at the right time and were making one hit out of every sixteen shots at that height. We get that now with the present sights, at eleven thousand feet, but it would only increase the velocity one hundred and fifty feet; so the best bombing can be done at about four thousand to six thousand feet. We can actually pierce more practically than we think we can theoretically. We estimated all these things theoretically for the height at which they would be dropped and the depth we could reach with different bullets. We have five hundred pound bombs and eleven hundred pound bombs. This larger bomb carries three hundred pounds of T.N.T. and another of this type six hundred pounds. Not one single one of these eleven hundred pound bombs failed us. We have also two thousand bombs which carry about one thousand pounds of T.N.T., and there is our four thousand pound bomb, which carries twenty-two hundred pounds of T.N.T.—the greatest projectile ever made. These projectiles were made up within two or three months. It would take ten years to make any boat to resist it, so the boat can never keep up with this development. The problem of devising a sufficiently strong weapon to sink anything now made is absolutely solved, but we have to have airplanes to carry them. We already have the sighting devices, etc., to make them hit. Of course it is your job to watch this development of the airplane, and of armament, too.

I WILL next direct your attention to the six hundred pound bomb being dropped from the airplane. You people here got up this bomb dropping device. By the way, the device you gave us for dropping that four thousand pound bomb was splendid.

There are three elements we have to watch in water—heighth, breadth with reference to the ground, and the direction of the wind. We have to have sights so as to hit a target in any direction of the wind. That is the principal thing to solve now. There is a great deal of work now being done along that line.

We can make sixty to eighty per cent of hits in dropping at targets on the water, and a bomb will affect the target no matter how it hits. We cannot do much with sub-surface craft because they can conceal themselves.

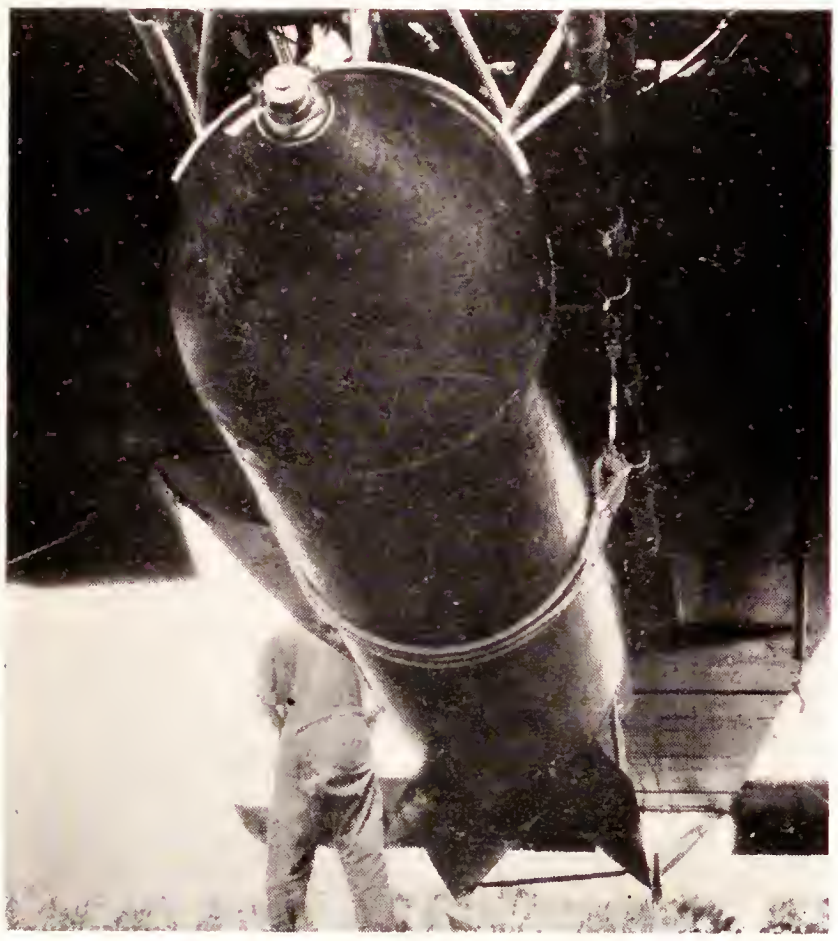
I spoke about assembling personnel from all over the country. We had to take men who were trained, often, in other branches of aviation, and put them on this work. Some of our bombardment men had been in either observation or pursuit. We got together an organization consisting of one heavy squadron, two light bombardment squadrons of DH's and one pursuit squadron of SE-5's We called our squadron using Martins and a few other ships, heavy bombardment. We organized them as well as we could. In charge of each ship was a pilot with his observer, crew chief, and his crew. The responsibility of every individual was fixed. We had an Air Park, in charge of Lieutenant Cover, which kept the ships in repair. On the airdrome we had all the pilots working, so that responsibility was fixed for everything. We trained the organization in the regular way—that is, G-1, administration; G-2, information; G-3, operations; and G-4, looked after supply. We organized that way, not only to make the project work, but also as a means of teaching



1,100-pound Demolition Bombs mounted on Martin Bomber, showing release apparatus.

personnel how an organization of that kind should be handled and applied, how the various branches of aviation should be worked together.

We had all organizations turned out complete once a week, or once every two weeks and had a review in the air of the whole outfit. Everyone worked every day from morning till night. It requires a tremendous amount of training to do any of this work and do it well, but at the end of the training period we could tell absolutely, under given weather conditions, just what would happen within a certain radius of action. Within four or five months we had the machine working perfectly. That 14th Squadron, as I said before, was a wonderful outfit —the most efficient bombardment outfit in existence at that time. It was composed of personnel who had been flying continuously for four years and who knew their business right down to the ground and this organization was the result. Of course an air outfit is one of the hardest units there is to organize. It is difficult to get their duties worked out in a way that is most efficient—



A 2,000-pound bomb mounted. Note size of bomb in comparison with figure of man in background.

particularly with handling big ships and tremendous amounts of explosives. Every little thing has to be watched. There is no branch of service which requires such absolute attention to details.

The bombardment is, of course, helpless without the pursuit. That is why we are watching the pursuit so closely while we are here and taking every bug out of it that we can. Aviation is really based on pursuit because if you can't fight the enemy out of the air you might as well stay at home.

Bombardment is handled according to the kind of target you have to attack. If you attack in the daytime with your organization, you like to have it in hand so that you can apply it quickly to the object that you wish to destroy. You want to be able to protect yourself as much as you can against hostile pursuit. Today we have intercommunication by signals, telephone, etc., so that we take our airplanes out together, that, in flights of one squadron, and attack in shifts. We found to attack in column was best with one flight behind the other. You see our object here. The ground day attack is in the V shape. They all drop at once, so that you see what communication we must have in the air. Communication is one of the most important problems we have to solve. Radio is one of the extremely important matters to develop, not only from ship to ship, but from ship to ground and from ground to ship.

Now, the way that this problem was gotten up by the Navy made it certain that everybody was going to see it. I don't think that anybody expected the ships to sink quite so fast as they did, except us, and they had everybody out there to see it. There were the battleships here, the destroyers there. They were seeing the fuss from the other side. It was quite a spectacle. This was the first attack made by the Navy with some flying boats. They used a bomb of thirty-seven pounds and dropped in formation. They did very well. We went over the target once to see the German submarine. They fired three sighting shots, made another turn, fired the rest of the bombs, and the submarine went right down. Everybody was surprised, and those small bombs affected a ship about two miles away to such an extent that she came limping into shore with her condensers out of commission. They were more careful about that later.

We took out everything we had, our pursuit, our lightweight bombardment and our heavyweight bombardment. Our pursuit was designed to attack the superstructure of any ship, so as to put their anti-aircraft out of commission, destroy their observation and means of working the ship. Our pursuit people actually thought they could have sunk it with those twenty-five pound Cooper bombs and came pretty near doing it. The way they attacked was to go out in regular formation, deploy in column, dive down, shooting machine guns until they got within two or three hundred feet, drop their bombs and then zoom. They could hit almost anything—in fact, one of them put a bomb right down the smoke stack.

The flight commander of the Martins began to hit along the water line first and tried to sink it with two one hundred pound bombs on the first attack. Of course, we did not know what the effect was because she sunk before we could get on board. Next, we fired forty-two bombs and they spread all over the place. I think the three hundred pound bombs are the ones that did the business because she sank very quickly afterward. It tore her right in two and she just folded up and went down.

We made several attacks against the *Ostfriesland*. Lieutenant Bissell's flight took out eleven hundred pound bombs. We wanted them to tear her superstructure and after that to make another attack. She was a very strong ship. It was very difficult to see the wind out there that day; there was not much smoke, so he had to come down and found the wind was twenty degrees off target. When he attacked it, out of five shots, he made three direct hits on the ship and the others were just over the side. *After the first hit the Navy began to signal to us to cease. He would have sunk her sure if the attack had continued.*

In the attack against the *Alabama*, we dropped two eleven hundred pound bombs at once, but they wouldn't allow us but one at a time on this ship. Those bombs threw up mighty columns of water at a great height. That is another reason why the whole bow lifted up.

THE *Frankfurt*, a cruiser was soon sunk. She had been bombed with three hundred pound bombs. Captain Lawson's flight came out and kept flying around for forty-five minutes. They only had fifteen minutes' gas left, so they sent a message to clear out and within fifteen minutes the ship was sunk. The hit by the six hundred pound bombs tore the deck off and also hit around the water line. We can always tell when we get a hit that will sink the ship because water comes up on both sides, and then we are sure we have it. You can see the whole ship go. She sank within twenty minutes after the attack started.

The *Frankfurt* was a beautiful ship in the water. It always reminded me of a swan. It was so very beautiful we hated to sink it. The *Ostfriesland* was also a fine ship, but she looked like an old bull dog in the water and we did not feel very badly about sinking her. The Navy hated to see these ships sunk on account of the sentiment attached to them, but there wasn't any sentiment with our crowd at all. To see a great structure like that, developed after all these years, go down in the face of an attack of these little ships was a marvelous

sight. Our whole force did not cost more than the price of a modern destroyer, and that force is perfectly capable of sinking the whole Atlantic Fleet.

The airplane that dropped the most effective bomb is here at McCook Field now. She was flown over the mountains from Langley Field, and, by the way, that airplane worked over the water all the time; twice later it went to Charleston, West Virginia; across the mountains; and now is in the middle of the states—there is no limit to its range.

This big ship began sinking immediately after the bomb hit her—it blew up all the way from amidships back. Her plates sprung and water poured in everywhere. It turned completely bottom side up and started to go down at the stern. It was one of the most impressive sights you could imagine. I have always heard so much about suction occurring when a ship sank, but there did not appear to be very much suction there.

I think that the sinking of these ships really caused more thinking in army circles than any one thing done in a long time. This was the first time this had been attempted in any systematic manner and the results are absolutely right. There was no question about it. I do think, however, that if this thing had not been prepared with such great care, if we had not had the great cooperation of the Engineering Division and the Ordnance Department, and of everyone else, or without the leaders we had, it would have been almost impossible. Those men just lived in the air. Such success is only gotten by constantly flying under the most difficult conditions, in all kinds of weather, up high, over the mountains, everywhere. That is the only way we could do it.

THE next thing we tried was phosphorous. It was a little hard to handle. In fact, it was dangerous to handle so that if you got directly over it, it might kill some people in the plane, etc. We have not used it much in the air. The phosphorous attack against the *Alabama* was wonderful. We made one attack with four bombs. One of the bombs hit the fighting top and three bombs struck on the deck. Each bomb made a sheet of flame as big in diameter as the length of the ship. This tremendous burst of flame occurred and the whole thing was enveloped in this mass of smoke for a long time. If you landed them on a battery of artillery you certainly would never see a horse again. You could scatter infantry, but I don't know how good they would be against seacraft. On the other hand gas scatters all over the ship and gets everywhere. That particular gas alone was sufficient to put the ship practically out, because you would have to keep masks on all the time, and we could make our other attacks on the remains of the ship. We went on board four days after one of these attacks and the gas was still there. The officers first thought they could go on board without their masks but they put them on pretty quick. It gets into your clothing. In fact, when some of them got back on shore the people waiting on table for them began to cry. If it had been phosgene, it would have been very much worse. We have calculated by means of gas attack to put New York out and our experience proved that it could be done. That gas is bad stuff. It gets into the interstices of the water and in all sorts of places and stays there.

The next thing we tried after the chemical weapons was night attack. Captain Lawson took these ships out in formation at night and attacked the ship in regular column attack. The second ship made two direct hits and it was a remarkable sight—it was simply wonderful, with phosphorous thrown all around. The decks caught fire and burned brightly for hours and when these ships came up at night it gave one a gruesome feeling to hear them overhead and not see them, and then all at once see three hundred pound bombs strike in the middle of the ships. It was a very spectacular thing. These two bombs alone would have put the *Alabama* out of business.

The third attack was made with heavy bombs. We sent seven ships out. Captain Lawson and Lieutenant Bissell took them out. Four ships carried one two thousand pound bomb and three carried two eleven hundred pound bombs, with orders to continue the attack as long as anything was left of the ship. Captain Lawson in the leading ship dropped a two thousand pound bomb which struck close by and the *Alabama* gave one lurch and sank within thirty seconds. When the attack was finished the whole thing was just a mass of torn iron—the whole superstructure was torn off and it was a terrible mess. You can figure that fifty or sixty per cent of the attacking force might be shot down, in combat, but even with the remainder you could put the ship out of commission.

The *Alabama* was launched in 1899. She was old but in very good condition, however, nothing like the *Ostfriesland*. She was anchored right off Tangier Island.

Smoke bombs have never been developed and are not satisfactory. You cannot drop them from any great altitude and they are not dependable; they can be perfected, however so as to put down any sort of smoke screen we want. These bombs go down a certain depth and are detonated and then rise to the surface. The fuse acts as a depth fuse.

Moving pictures were taken from airplanes, and our photographic personnel did wonderful work in following the bombs right down to the water. Every hit was photographed.

The entire project was carried through in a wonderful manner and reflects great credit on every one who was connected with it.

Education in Industry

The Schoolhouse of The National Cash Register Company is an outstanding example of the dominant position that education has taken in modern industry.

Thirty years ago this company realized that its growth and progress depended largely upon the attitude of its employees toward their work.

As a result, many forms of welfare work were begun. Better working conditions were provided. Employees were urged to take advantage of the company's free night schools.

This work proved so helpful to both employees and the company that it has become one of our fundamental policies.

Welfare work and the facilities for educating employees are only a part of the many things that make our factory unusually interesting. You are cordially invited to visit us.

The National Cash Register Company
Dayton, Ohio

NOTED ENGINEER ADDED TO PIONEER INSTRUMENT COMPANY STAFF

The Pioneer Instrument Company has announced the addition to their technical staff of Mr. Louis D. J. A. Dunoyer, of Paris. Mr. Dunoyer is a well known French consulting engineer. He will act in an advisory capacity for the Pioneer Company and will particularly assist their French representative, Mr. R. E. Badin, in the introduction of their Earth Inductor Compass in Europe.

Lieutenant John A. Macready—U. S. Army Air Service pilot ready to take off in the original Wright Brothers flying machine at the International Air Race Meet, Dayton, Ohio, October 4, 1924.

Are You Keeping Pace With Aviation ?

How many people, had they known ten years ago what they know today in the development of the Automobile, could have made an easy fortune.

How many village blacksmiths kept pounding away while the fellow next door sensing the change of affairs tacked up the sign "Garage" on his woodhouse and built up a thriving business almost over night.

Aviation is now in its infancy—It is passing an epochal crisis toward the great future it must ultimately attain.

Again we broach the question: Are you keeping pace with Aviation Development ?

Slipstream Monthly—The "Ace" among Aeronautical magazines is the one medium for the sensible fellow who wants to keep in touch with the real important things in Aviation circles

Slipstream is well illustrated and written in readable style.

SUBSCRIPTION BLANK

Slipstream Publishing Company.
401 Beckel Bldg., Dayton, Ohio.

Gentlemen:

Please enclosed find (Draft) (Check) Money Order) to the amount of two dollars ($2.00) which entitles me to one yearly subscription to the Slipstream monthly

beginning with the ....issue.

Name ....Street and No ....

Town ..... State.....

THROUGH the entire history of aviation over a period of 20 years the Wright organization has maintained its high position.

Its leadership has been soundly built upon extensive research and intelligent engineering development, although its experience includes the manufacture of aeronautical equipment in extremely large quantities.

The Wright organization, ever mindful of its first achievement—the art of flying—continues to contribute each year its best ability and engineering experience to the advancement of flying.

WRIGHT AERONAUTICAL CORPORATION
PATERSON, N. J., U.S.A.

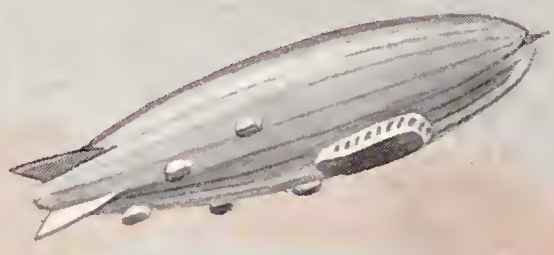
WRIGHT AIRCRAFT

"The Identification of Incomparable Service"

Navy ships equipped with Wright Air Cooled Engines flying in formation over San Diego, California

SLIPSTREAM

DEVOTED TO AVIATION



New
McCook Field
Edition

Vol. 6 No. 3

1925

DAYTON
The NATION'S AIR CENTER

HASENSTAB DAYTON — OHIO

$2.00 PER YEAR

25¢ PER COPY

SPEED WITH SAFETY

Curtiss Carrier Pigeon

THE Air Mail Division of the United States Post Office Department is the greatest exponent of commercial aviation in the world. Having successfully proved over an operating period of eight months that a day and night schedule between New York and San Francisco was feasible and practical, the next step was to obtain aeroplanes that, with the same faithful Liberty motors and with the same or better performance, would double the pay load, thus doubling the income without materially increasing the operating costs. The Curtiss Aeroplane and Motor Co., Inc. were quick to see the opportunity and developed for the Air Mail Service, the Curtiss Carrier Pigeon.

On the official tests this machine made the following remarkable performance with full fuel load and a pay load of one half a ton, twice that of the present DH.

High speed	128 MPH	Crusing speed at 1500 RPM	108 MPH
Landing speed	50 MPH	Ceiling	16,200 feet

Climb 1,000 feet per minute to 3,000 feet

The official cross-country flight of one hundred miles was made in fifty-nine and one-half minutes on twenty gallons of gasoline.

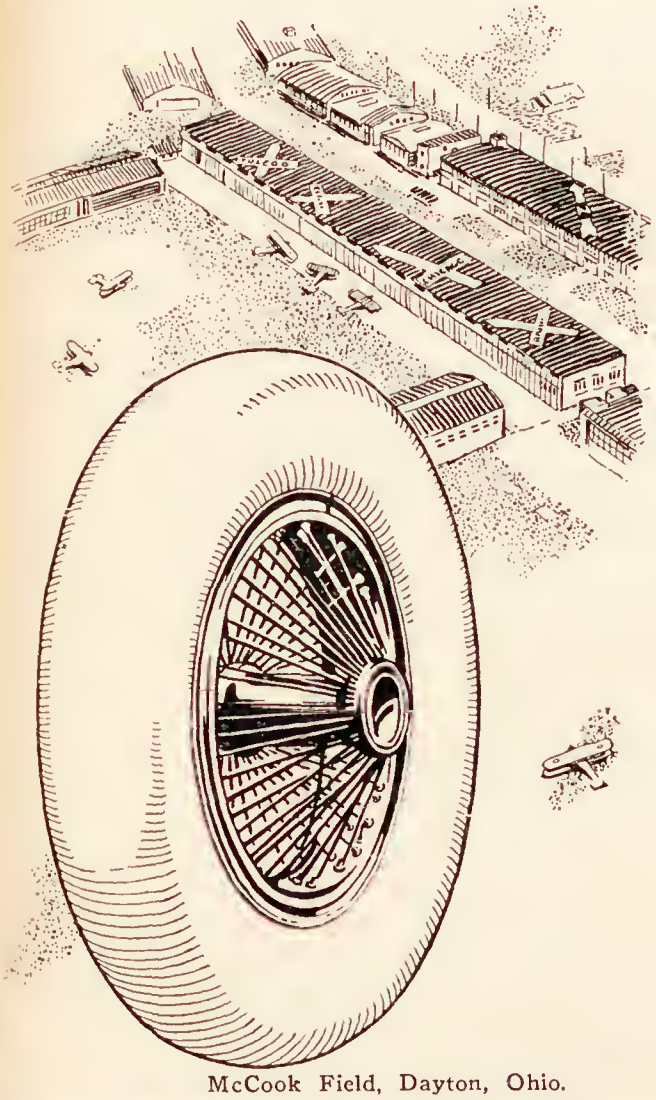
Five miles per gallon - Five cents per mile - Ten cents per ton mile

This is Commercial Aviation with Real Economic Possibilities

Curtiss Aeroplane & Motor Co., Inc.

Garden City, N. Y.

Douglas Cruisers, made by the Douglas Co., Santa Monica, California, were selected for the "Round-the-World Flight" in competition with several foreign-built planes.



McCook Field, Dayton, Ohio.

Just Landed!

It was Bastile Day in France when the 'Round the World Fliers landed at Le Bourget Field near Paris. Crowds quickly gathered to pay tribute to the intrepid Americans who were blazing a new trail through the air.

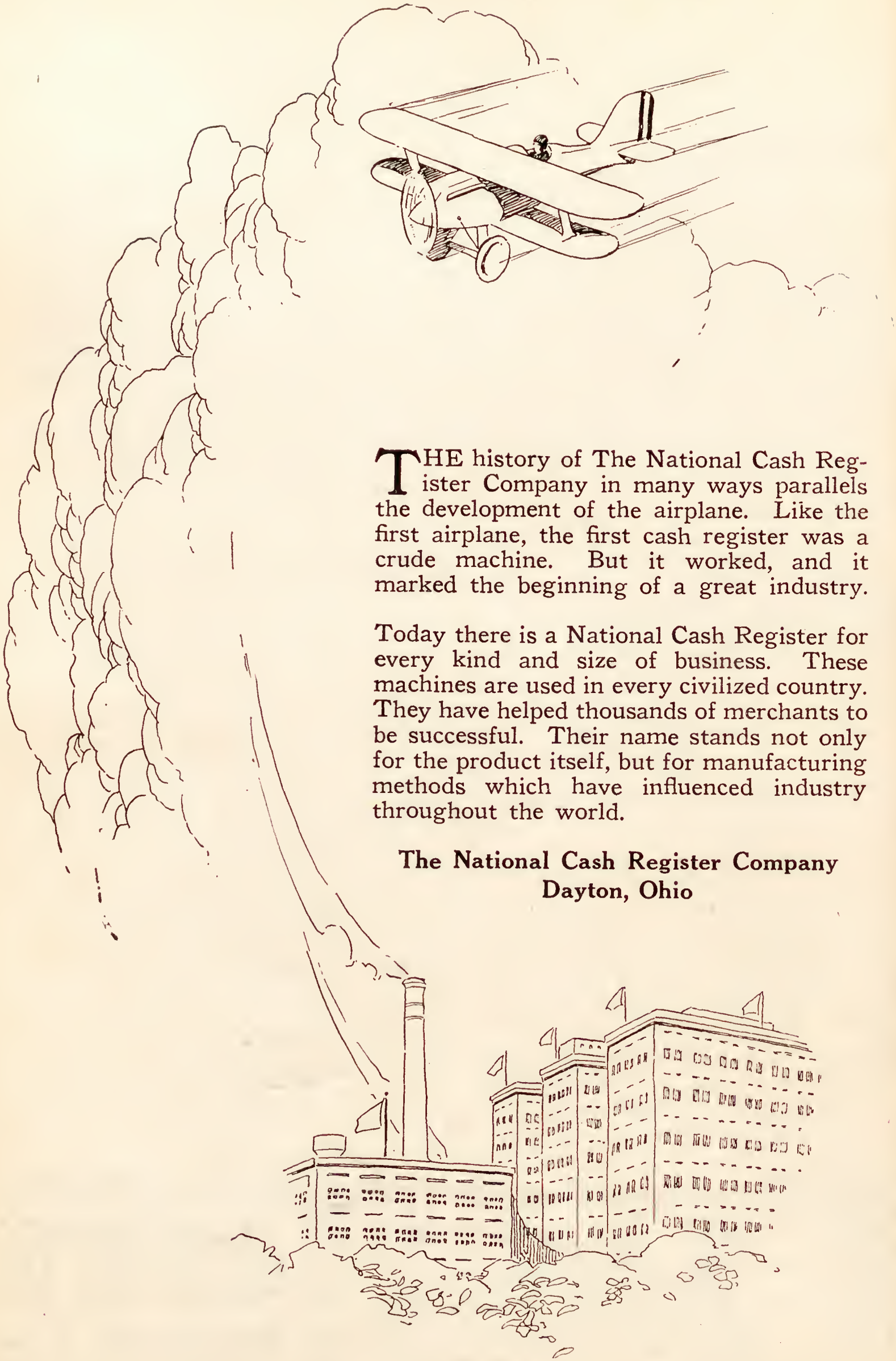
What a load of satisfaction those fliers felt when they examined their planes and found each part and piece doing its work so nobly. Particularly were they gratified with the performance and dependability of the Dayton Wire Wheels with which each of these new famous planes were equipped. Throughout their entire journey they were able to depend implicitly on their Dayton Wire Wheels for safe landings on the cross-country portions of their flight. Thousands of tests had conclusively proved that Dayton Wire Wheels do not crush.

For years our Engineers have co-operated with those of McCook Field, other flying fields, and airplane manufacturers in the developement of the highest type of the highest type of wheels for aircraft.

"for the Man Who Drives or the Man Who Flies"

The Dayton Wire Wheel Company
Dayton, Ohio

Dayton Wire Wheels
QUICK DETACHABLE

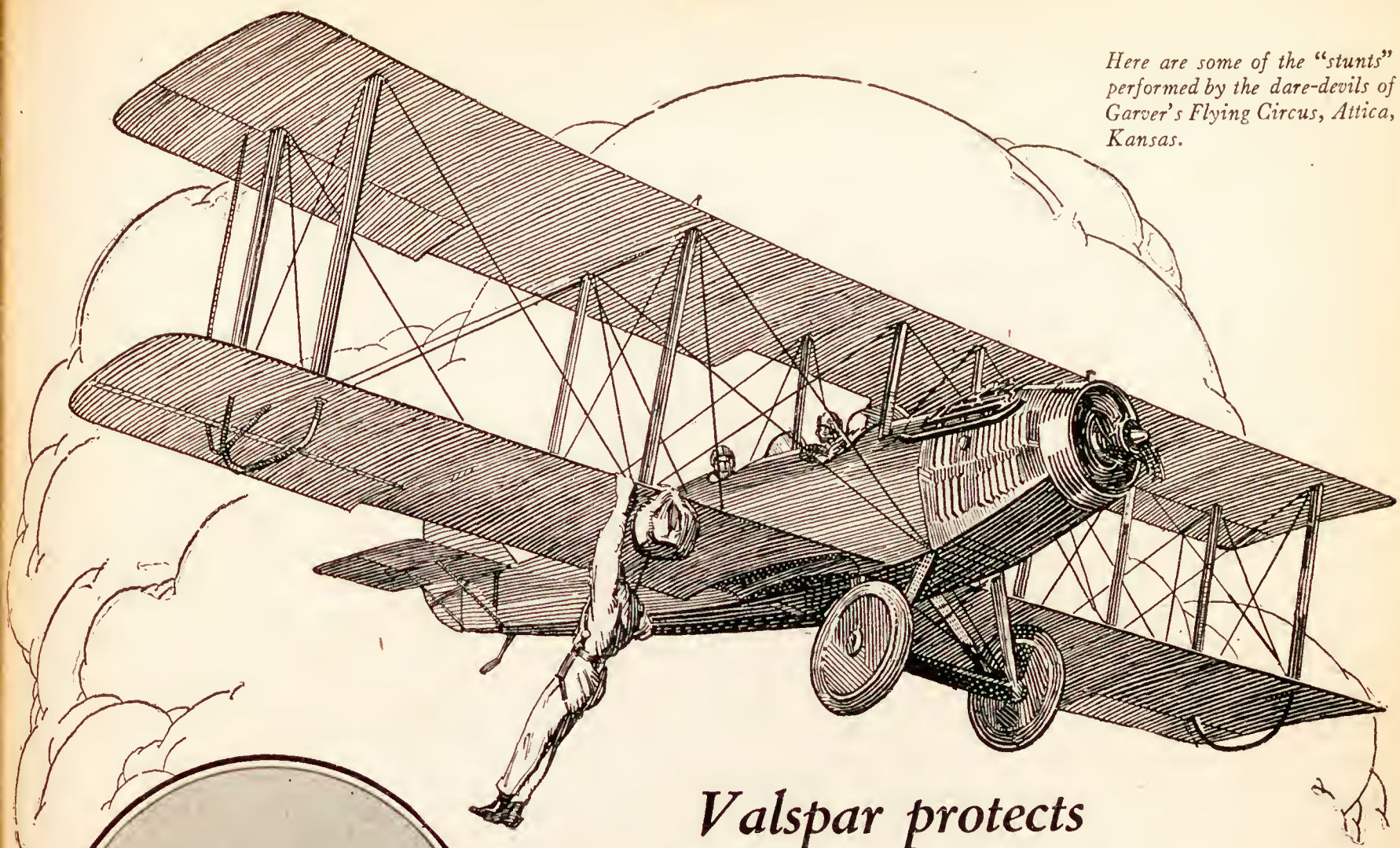


THE history of The National Cash Register Company in many ways parallels the development of the airplane. Like the first airplane, the first cash register was a crude machine. But it worked, and it marked the beginning of a great industry.

Today there is a National Cash Register for every kind and size of business. These machines are used in every civilized country. They have helped thousands of merchants to be successful. Their name stands not only for the product itself, but for manufacturing methods which have influenced industry throughout the world.

The National Cash Register Company
Dayton, Ohio

Here are some of the "stunts" performed by the dare-devils of Garver's Flying Circus, Attica, Kansas.



Valspar protects the flying circus!

TURNING somersaults on the wings of a swift-flying plane! Leaping from one plane to another in mid-air! That's the form of entertainment furnished by the dare-devils of Garver's Flying Circus.

A man has to have supreme confidence in pilot and plane to be willing to risk his life in this way. Naturally the three "Laird Swallow" planes used by Garver's performers embody every feature that makes for safety, durability, ease of maneuver and control.

In the important matter of finish, the planes are Valsparred, of course. For wing surfaces must always be kept in perfect condition, fabric must have 100% protection from weather and wear, to insure the safety of the performers.

The Laird Company knows from past experience that Valspar is the *only* varnish that can meet such exacting requirements.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

Constantly Building for the Future

We firmly believe in the future of Dayton and the Miami Valley. We expect more manufacturing plants to locate here and for our present industries to expand. These growing and new industries will necessarily mean an increase in population, more stores and office buildings and an even more prosperous community.

With a greater Dayton and Miami Valley we anticipate an enormous increase in the demands for electric service. While our facilities are at all times adequate to care for the growing needs of the territory we serve we are continually improving and enlarging these facilities in preparation for the future.

It is impossible to forecast how much electricity will be needed on a certain day; therefore, we are always prepared for a peak load because we must furnish good service at all times. As the demand for our service increases, we begin to approach the limits of our capacity. However, we never reach this point, for, anticipating future needs, we install new machinery or do whatever is necessary to keep our facilities ahead of the demands made upon us. This constant improvement provides dependable electric service to our present customers and permits the instant serving of new or growing enterprises.

The marvelous growth of Dayton and the Miami Valley is largely due to its industries, and we pride ourselves in having a share in this development because of the dependable electric service economically furnished by us.

The DAYTON POWER & LIGHT CO.

A Man Who Does Things

Successful General Contractor Career of J. I. Geiger Who Has Played A Prominent Part in the Upbuilding of Dayton

IN the general contracting arena of Dayton there is no name which is better known or more highly regarded than that of Geiger and justly so as J. I. Geiger has been actively identified with the upbuilding of the Gem City for the past twenty years, during which time he has gained a well-merited reputation as among the most reliable and capable general contractors in this section of the State.

J. I. GEIGER

The initial entrance of J. I. Geiger in the local contracting field was in 1905 when he executed a number of excavating contracts for residences and office buildings. With the last several years the field of his contracting operations has gradually developed until today he specializes not only in excavating but in sewer contracting, road building and all classes of concrete and sub-division work and his facilities are such that he can enter into the largest contracts and bring the same to a successful conclusion in the shortest possible time consistent with good work.

The extent of Mr. Geiger's operations may be gleaned from the fact that he constructed the Rubicon storm sewer for the city of Dayton, and the Westwood sanitary outlet for the county. An important piece of work well done was the completion of all the street and sewer work for the rapidly growing community of New Osborne, Ohio, near the new McCook Field site. The paving of N. Main street, Louie street, and Catalpa drive north of Hillcrest avenue and the recently completed three and a half miles of brick paving on the Springboro pike are concrete examples of his good work in the paving line. His facilities and long experience as an excavating contractor have procured for him some of the most important contracts in that line in the city among which may be mentioned the excavation for the Memorial Bldg., Rike-Kumler Bldg., Dayton Daily News Bldg., Church Bldg., Rowe Bldg., and the Third National Bank Bldg., while his work on the sub-divisions of Ayr-mount, College Hill and Aerial Park were highly creditable. Examples of modern constructive work. At the present time Mr. Geiger is doing the excavation work for the Wabash Portland Cement Company at New Osborne and in the near future he will commence operations for the building of the Stout street sanitary sewer for the city of Dayton.

It may be stated that the value of the equipment for contracting purposes owned and operated by Mr. Geiger is close to $70,000. He was recently elected a director in the Highway and Public Works Division of the Associated General Contractors of Dayton, a position which he is admirably equipped to fill.

Considering his well know ability as a contractor his stand as a booster of Dayton we trust that J. I. Geiger will have an active part in the construct ing work of the new McCook Field Air Station.

Since Governement restrictions require work of a strictly specified character, the past record of the J. I. Geiger firm should have a particular bearing on the awarding of this contract work on the new McCook Field site. **--Adv.**

Slipstream

SLIPSTREAM--The stream of air driven aft by the propeller.

VOL. 6 MARCH No. 3

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879

SUBSCRIPTION RATES

One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL, Editor

CONTENTS

WHAT WILL WE LEARN FROM THE WRECK?

At Wilbur Wright Field, Dayton, a few weeks ago several condemned airplanes were turned loose under their own power on an incline at the end of which they came in contact with a conerete wall. Photos were made of the "erash" to get information on the elimination of fire in erashes. In the above eartoon M. Stinson, artist for the Dayton Daily News, has used the novel erash tests to illustrate the "tragie" outeome of General Mitehell's outspoken plea for aviation and a separate air service. It is a good illustration for all patriotic and true Americans to study.

Is Dayton Losing Confidence In Aviation?

THE citizenry of Dayton, Ohio, which has been regarded traditionally as being 100 percent friendly to aviation has lately wagged its head with no little concern at the lack of material realization of its ambitions in aeronautical lines and at the sudden stir of propaganda in other cities of the middle-west that would tend to steal Dayton's expensively-bought and dearly-cherished honor as the "Center of Aviation."

Dayton can ill-afford to loose this stellar role after all she has sacrificed to acquire it. During the last several years Dayton citizens have been persistently approached for substantial donations toward aeronautical undertakings, particularly in connection with the New Site of the McCook Field station and the more recent International Air Race venture.

Without belittling the primary influence of genuine interest in aeronautical development which prompted Dayton people to give so liberally toward these things, it must be said that they justly retained a selfish belief that the money they handed out would be returned, at least indirectly, in the advancement of community industrial conditions. No one can judge Dayton people for expecting to get certain value received for the hundreds of thousands they have so graciously placed in their several aviation projects, although, upon the other hand one must admit that there is no other community in the world more liberal than Dayton in matters of pure civic pride and industrial progressiveness. She has been followed as an example in the latter connection, by other wide-awake cities, while delegations from various lines of industry assemble periodically at Dayton to study her factory systems and ideas on civic betterment. But it appears that Dayton's liberal contributions to aeronautical ventures have been discouraging. Her optimism has been dampened either by the slow progress of plans in taking on a material aspect or from financial failures such as that which accompanied the International Air Race meet staged in Dayton last October. Things have thus far turned out quite differently than that pictured in the heated periods of the money-raising campaigns.

Of course, although failing to make a financial success of the Air Races Dayton consoles herself in the fact that she staged the best meet of the kind that has ever been held in this country and showed the world that she was prepared to entertain and accommodate conveniently 300,000 people. Dayton planned and engineered the 1924 Air Race meet upon a scale which was thought impossible for a city of its size and despite the comparatively small attendance, carried the undertaking through with such dignity that the whole world was given to admiration and praise for her spirit. Although, secretly disappointed in the business result of the Race meet, Dayton will no doubt again in the future make a bid for the International Air Races and again

Some of the Things Dayton Has Done for Aviation

GAVE the first successful airplane to the world.

Represented the production and training center of our aviation program during the World War.

Offered through the late John H. Patterson, president, the National Cash Register Plant—"The Model Factory of the World," for turning out intricate aircraft parts and other mechanical devices of high precision, upon a basis of actual production costs. The "cost-plus" contract system being refused.

Organized a chapter of the National Aeronautic Association comprising over 2000 members and representing the largest local chapter of this organization by a considerable margin.

Staged International Air Races of 1924 with the construction of the largest and most completely equipped airdrome in the world.

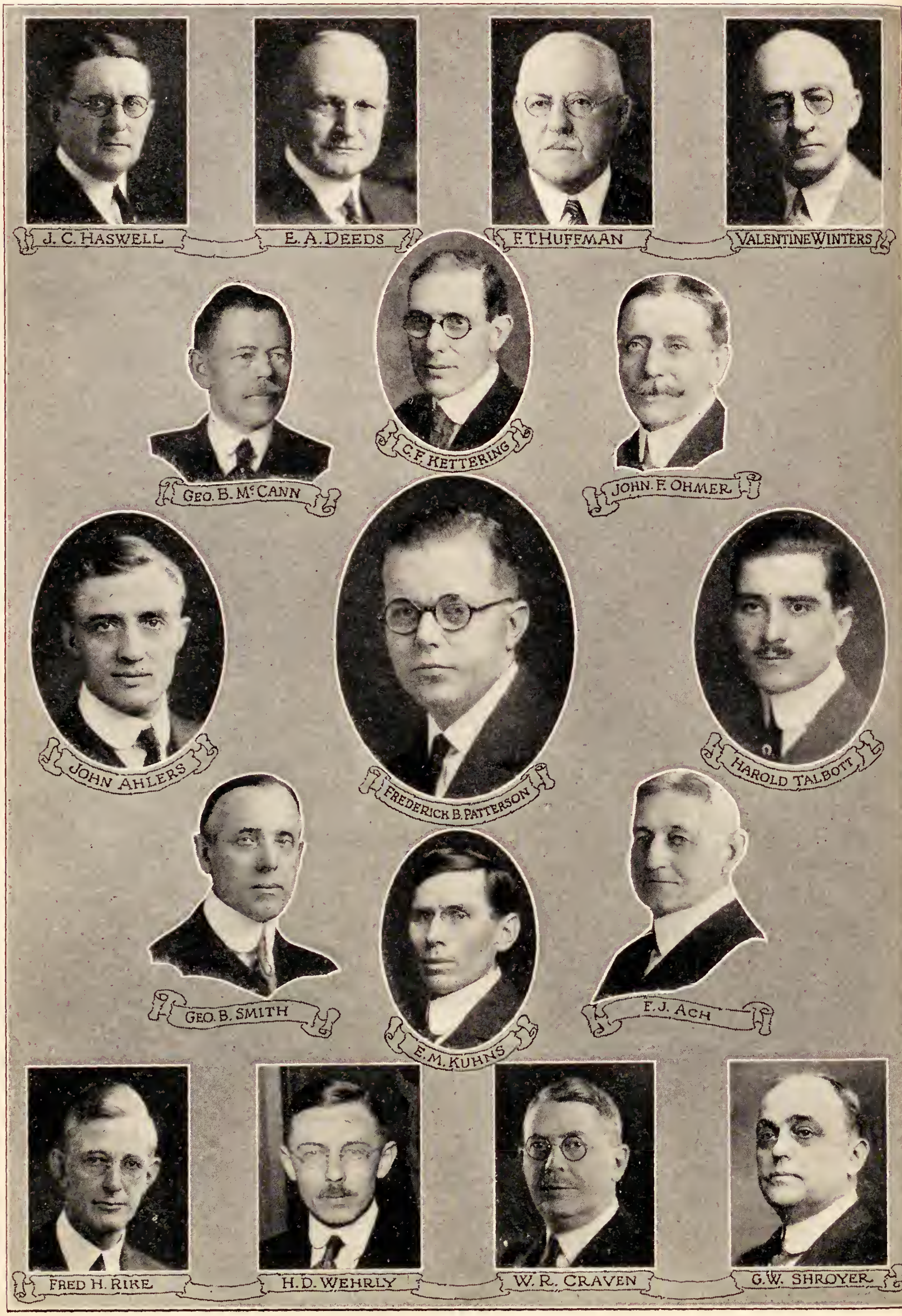
Is the location of Johnson Airplane & Supply Company and Johnson Flying Service, Inc., only substantial and thriving commercial aviation concern in the United States. A $200,000 corporation.

McCook Field located in Dayton has contributed innumerable improvements in the line of aircraft navigation instruments, night-flying equipment, engine and structural designs, metal alloys, etc. In addition, most of the important air records held by the United States Army Air Service were made in Dayton by McCook Field pilots and equipment.

Dayton is the home of more aeronautical engineers, mechanics, machine workers and other experts of specialized character in aircraft manufacture, than can be found in any like center of the world. There is also located here scores of tool and machine shops doing important contract work for the War Department. Over 99 percent of all airplane wheels used on U. S. airplanes are made in Dayton.

Dayton citizens, by popular subscription raised in thirty-six hours over $400,000 for the purchase of a vast tract of 5,000 acres of ground near the eastern city limits which the city of Dayton presented to the Government as a permanent site for the Engineering Division Army Air Service, McCook Field.

Leaders of Aeronautical Progress in Dayton



make a success of it, even at the cost of much money to her leading citizens.

THE primary issue which is worrying Dayton citizens at this time is the question of McCook Field and the Fairfield Air Intermediate Depot near by at Wilbur Wright Field, two important Army Air Service stations built during the World War and now justly regarded by Dayton as permanent industries of the community.

When it became known two years ago that the Government, as a matter of economy and general improvement of conditions must find a larger and more adequate site for McCook Field, Dayton—led by its most esteemed citizen, the late John H. Patterson, president of the National Cash Register Company, immediately set forth plans for securing a suitable site near Dayton where the McCook Field Experimental plant might be permanently located.

Unhappily, in the very midst of this effort, John Patterson came to an untimely death. His demise was a sad blow, both to Dayton and to aviation in general, for certainly, neither had a better friend than this great industrial leader, who had "built his house by the side of the road."

But John Patterson possessed both human and business foresight. He had trained his son, Frederick B. Patterson, to step in his boots when it came time for him to lay aside the burden of active participation in the conduct of business. It could almost be said, therefore, that Frederick Patterson's interest in aviation and Dayton community development is inherited.

Soon after his father's death, Frederick B. Patterson took up the fight, both locally and nationally for aviation's development. Mr. Patterson made an immediate investigation of land tracts in the vicinity of Dayton, and when he found that there was a tract of 5,000 acres just east of the city limits that could be purchased, he set out to acquire it and offer it to the United States Government as a permanent site.

Naturally, such a large tract of land in this thickly populated and valuable farming district cost a lot of money. It was up to Dayton citizens to dig down in their pockets out of pure public spirit and raise some $400,000 to buy the ground. Led by Mr. Patterson a quickly organized body, known as the Dayton Air Committee, set out to raise the money by popular subscription. In one of the swiftest money-raising campaigns ever conducted in the community—thirty-six hours to be exact, more than the necessary figure of $400,000 was realized.

Now to the ordinary subscriber to this fund the impression was naturally gained that the gift of the tract to the Government would settle matters regarding the final disposition of the McCook Experimental Field. Such was not the case for when it became known that Dayton had made this gift of land to the Government, other cities awakened to the advantage of having this important post near them and professed a willingness to make even more flattering offers to the Government as an inducement to getting the station. Political influences from various other communities held their sway and selfish adverse arguments put forth against the selection of the Dayton site. The whole thing resolved itself into an example of the proverbial "red tape" attributed to all Government routine. Consequently, Dayton citizens who had given so liberally had a right to be moved to exasperation, to find that despite their gift, they had a legal and political battle to fight in order to retain the Engineering Division plant.

These foreign influences became so strong that had it not been for the concerted and determined efforts of the younger Mr. Patterson it is doubtful if Dayton could claim McCook Field today. Mr. Patterson spent thousands of dollars not to mention the time sacrificed from his official duties as President of the National Cash Register Company, to show the War Department officials the economical and practical advantages in favor of the Dayton site. He induced these officials to come to Dayton and see for themselves the exact location topographical character of the great stretch of level ground which Dayton had bestowed as a gift. He utilized the Publicity and Printing Departments of the National Cash Register plant for turning out charts, illustrated pamphlets and other literature for distribution among members of Congress, the Senate, and other interested officials. He kept personal representatives in Washington and turned his legal staff to the attention of matters in the proper deeding of the tract to the Government. All this Mr. Patterson did out of love and esteem for his father's cherished wish and his public interest in Dayton. We must in addition remember that during this period of 1924 Mr. Patterson was performing the duties as President of the National Aeronautic Association and made a personal trip to Europe to induce foreign entries to participate in the International Air Races held on the New McCook Field site, east of Dayton, last October.

JUST recently the waning confidence in aeronautical schemes on the part of Dayton folks took on a new spirit of elation when word was received that the long controversy in connection

with the formal acceptance of the New McCook Field site by the Government was over. The War Department had accepted it and Mr. Patterson had delivered the deed in person to President Coolidge, whose acceptance was incorporated in a delightful letter of grateful thanks to Dayton for this liberal contribution toward future aeronautical development.

Then out of the clear sky came the attacks against McCook Field in Congress. The controversy arose as a result of the $500,000 initial expenditure for construction work on the new Dayton site asked for by the Chief of Air Service and included in the Air Service Budget for the fiscal year. Representatives LaGuardia, from New York, and Reid, from Illinois, assailed the expenditure with a general attack upon McCook Field's value. The ultimate aim of these Congressmen seems to have been the total disintegration of the Engineering Division Army Air Service and the corresponding Naval Aircraft Factory operated under the division of the Bureau of Aeronautics, U. S. Navy. Fortunately for the good of aviation and the national defense this general criticism against McCook Field's worth was ably defended by Congressman Roy G. Fitzgerald supported by the entire delegation of Congressmen from Ohio and Senator Fess, also of Ohio, who came over on the floor of the House to make his stand known. The important role McCook Field holds in all aeronautical activities both civil and military was graphically outlined by Mr. Fitzgerald, who has studied the work of the plant by direct contact for several years. This defense of McCook Field and of Dayton in making the gift of the new site resulted in the defeat of the amendment offered by the two Congressmen to strike out the $500,000 McCook Field moving item from the budget.

ONE would think that with the final passing of the budget measure, even to the President's signature, would put the citizens of Dayton at ease and with the satisfaction that their battle to retain McCook Field had been won. But such is not the case. The rumor is now going about that no fine new buildings of permanent construction are going to be put up for several years contrary to original plans. True enough, the architectural drawings and model lay-outs of paper-mache are completed and are delightful to behold. The "gingerbread" models are good to look upon indeed, and appear in some degree to visualize a recompensation for the hundreds of thousands of dollars, and months of time and worry contributed by Dayton people. Along with this came the news that plans were under way to have the Fairfield Air Intermediate Depot now located at Wilbur Wright Field and adjacent to the new McCook Field site moved to Middletown, Pennsylvania, where a similar depot is located. Again Dayton was forced to raise up in arms to save her air stations, and again it was Ohio Congressmen and Dayton citizens who saved the day. When it became known that the object purported for making the move was based upon economy Congressman Brand supported by Congressman Fitzgerald, Senator Fess, and a delegation of New Osborne (a thriving new village near Wilbur Wright Field), and Dayton citizens took the point at issue and presented positive proof that a greater saving would be realized in centering the depot activities on the new site just presented to the Government. Thus far, the Dayton community seems to have the better of the argument and there will be no moving of the F. A. I. D. until a more thorough investigation of the "economy" features are made, at least.

THUS, as we can readily appreciate, that Dayton has just reasons for "getting her breath" in aeronautical things. She has done far more than any other community for the advancement of this great new science. Her citizens have been loyal, they have been liberal, they have sacrificed time and money to maintain the city's position as the "Center of Aviation." But her people have other business interests to look after and in this period of rest after a long, tedious battle it is only natural that other mid-western cities who aspire to this honor will put forth efforts to steal her title.

It only remains for construction work on the New McCook Field station to bolster up Dayton's enthusiasm to even greater goals in aeronautical lines. We would therefore have all those who may be attracted to propaganda from other cities to recall just what each has done for aviation's benefit in the past. After all she has paid, Dayton will never let this important role slip from her grasp, for it is only to the future that she can hope for recompensation.

Who dares question Dayton's right as—The Center and Home of Aviation—is she not justly entitled to it?

The Awakening of Commercial Aviation

In Dayton and Elsewhere

THERE has been much prophecy during the last several years as to just when commercial aviation would begin to show appreciable activity. Since the World War the vast possibilities in this field have been revived so often that the public has tired of so much visuality and so little actual operation.

The year 1924, however, has presaged a general turn of confidence in the adaptibility of aircraft to practical commercial uses, and the promise of real profits to the private promoter in such ventures. Consequently, there is noted now with the opening of Spring and better flying conditions a tidal wave of newly organized "flying schools," flying parks," "Aerial Taxi Services," aerial survey and phography concerns and itinerent "gypsy flyers," rushing into this promising new industry, with a view to getting the jump on the other fellow.

From present indications, one need no longer have any doubts as to when the period of commercial aviation will arrive. It is now upon us and we will point out positive proof to show it. We will aim to proove further that despite any comparative figures that may be offered to show that we are many years in the lurch of European development, what is being accomplished here in the United States is based upon substantial, healthly growth without the stimulation of government or state subsidy.

In Detroit there is a concerted movement to inagurate aircraft manufacturing upon an extensive scale of production. The Stout Metal Airplane Company in its new plant built by The Ford Motor Company interests near the fine, new municipal airdrome, known as Ford Field intends to go into immediate production on its "Air Pullman." These planes will be placed in inter-city, passenger-carrying service and operated either by outside capital or by the company itself which is made up of highly financed members. The Aircraft Development Corporation, another Detroit enterprise, is working diligently upon a type of dirigible airship for commercial service. The envelope is to be covered with sheet aluminum and the passenger compartment fitted as pretentiously as any steamship accomodations.

Just recently Matt. Q. Corbett, who has been employed for some years at McCook Field in the lighter-than-air division, Army Air Service resigned his position to join this firm which is headed by Ralph Upson whose name has been synonomous with balloon and dirigible building both in this country and abroad for many years.

Alfred Verville, noted Army Air Service designer along with Fred Flader designer and both stationed at McCook Field, Dayton, Ohio left the service recently to go into the commercial Field. Another Detroit enterprise known as the Buhl-Verville Airplane Company claims them and furnishes a good indication of just how much confidence these seasoned in service agents have in the commerical possibilities.

Lieutenant H. R. Harris, Chief of the Flying Section, McCook Feild has secured a leave of absence for one year and is taking charge of extensive insect dusting tests in the Boll Weevil areas of the southern cotton states. There are some thirty planes in this insect armada operated by Huff-Daland, Inc., a private enterprise which looks forward to untold expansion should their dusting tests prove successful even in a modest degree. It remains, of course, with the outcome of this work as to whether the Army Air Service can again claim the able services of Lieutenant Harris.

Curtiss Aeroplane and Motor Company, Inc., a firm which has never diverted much attention to the commercial demand announce that they will soon come out

What Dayton Aspires to in Aviation

To build a Boulevard leading from the business center of the City to the New McCook Field Site and Wright Memorial Plot.

To erect upon the twenty acre promontory overlooking the New McCook Field site and adjacent "Huffman Prarie" where the first successful airplane was housed and tested, a beautiful Memorial Building in Commemoration and honor of the Wright Brothers.

To provide a suitable municipal airdome with privileges and accomodations especially for commercial pilots and planes. For use also as an Air Mail Field upon the proposed extension route through Dayton to Cincinnati and other southern and western points.

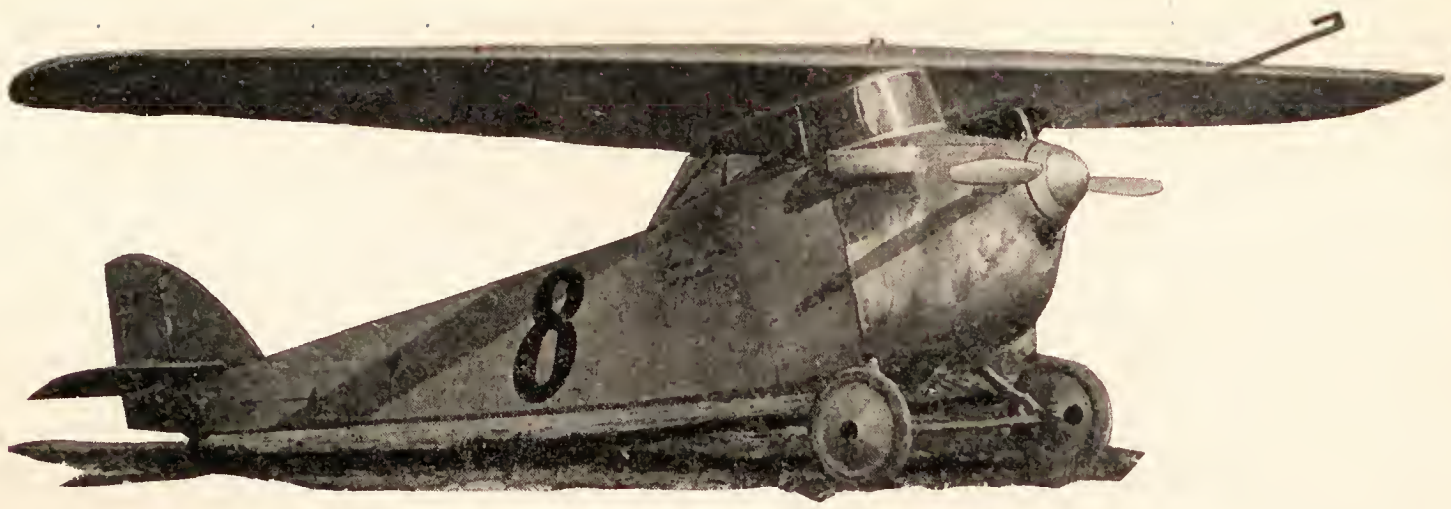
To encourage commercial aircraft manufacturing concerns to locate in Dayton by offering gratis factory sites at favorable points.

To become a center of the flying school industry in which phase of aviation it can particularly excel with the presence in Dayton, of hundreds of apt instructors, mechanics, and government aeronautical stations where direct access to important developments can be gained by the student, and studied first hand.

To maintain its historical and traditional advantages by educating its citizens, and particularly its youth in the vital phases of the aeronautical industry that her citizens may be identified as closely associatedd with aeronautical activities.

To become "The Center of Aviation" in fact as well as in spirit and sentiment.

Walter B. Moore, Manager Dayton Chamber of Commerce



The DJ-1, winner of the first American Light Plane Competition. Designed by Ivan H. Driggs, Chief Engineer of the Johnson Airplane & Supply Company, Dayton. The "Canary" the latest design of light commercal plane brought out by Mr. Driggs is shown on our back cover. These two ships, flew during entire trials and required no extensive alterations which establishes an exceptional engineering accomplishment.

with a light plane using an OX standard Curtiss motor. In addition to this they have just offered for approval the new "Carrier Pigeon" ship popularly designated as the first "Aerial Truck," and designed particularly for use in the Air Mail Service. Officials of the Curtiss firm express the belief that they can now go into production of commercial planes with an outlook for a ready demand.

The Loening Aeronautical Engineering Corporation of New York City, recently came out with their novel Amphibian plane which they likewise hope to have used in the Air Mail Service. It has proven remarkably seaworthy even in rough sea water, while it can be landed in safety on the most difficult fields. It would appear that this plane will fill a unique place in the line of commercial work such as that of the Air Mail Service. It is true that much of the valuable time gained by using strictly "inland" planes in the Air Mail Service is lost at points by the distance of terminal landing fields from the station or post office. This condition is present at New York, at Chicago and at Omaha on the Transcontinental Air Mail Route. The Amphibian makes it possible for the mail to be delivered much closer to the post office and station at the points mentioned by landing on available water spaces. The Amphibian could also be used to meet incoming vessels which are delayed by tide or tug service and outgoing vessels which have missed important mail, merchandise or passengers.

The Lincoln Standard Aircraft Corporation of Lincoln Nebraska, has reported a rush of orders on their passenger carrying ships. Ray Page, president of the firm recently left on an advertising and demonstrating tour in one of their new LS-5 ships and will visit Texas, Arizona and parts of Mexico including Mexico City. He expects to sell a number of these ships to Mexican interests which have already purchased several Lincoln Standard planes

Cleveland is making a determined effort to become aeronautically important. To be absolutely assured of permanent air mail service William R. Hopkins, City Manager, enlisted a crew of aeronautical figures including Eddie Rickenbacker, American Ace; Major Yount of the Army Air Service and Glenn Martin well-known Cleveland Airplane manufacturer and "sold" the city council on the leasing of a new municipal flying field of more than 500 acres and with a privilege of later acquisition of 500 additional acres. Washington postal authorities are now making plans to install great searchlights to guide the nightly flying on this field to be known as Brook Park Field, in conjunction with the Chicago-New York Night Air Mail Service to be inaugurated in July.

Glenn Martin is making important negotiations with C. P. Van Sweringen providing for a special aircraft landing station on top of the train sheds of their new station buildings. The Van Sweringens are gradually acquiring a very important and extensive railway system which bids fair to vie with the several older systems and it is well to note the tendency of these new railroad people to tie in with this new mode of transportation.

In his address before the Cleveland Councilmen Captain Rickenbacker said: "There can be no doubt of the commercial future of aviation. Figure it this way, America spends $800,000,000 a year on maintenance of roads, and more millions upon other forms of transportation, all of which are limited in their carrying capacity. In the air, we have practically no limits on capacity and we have no maintenance of way. Our problems are chiefly two, to get machines and proper terminal facilities. Operating costs are relatively nothing"

Out upon the west coast there has been an important merger of the Varney Air Service with the Checker Cab Company. This consolidation aspires to instituting a regular taxiplane service to any point on the Pacific coast. The new company located at San Francisco will be known as the Checker Air Service Company and is capitalized for $500,000. The business affairs will be directed by the following officials: President J. A. Baldi; Vice-President and General

Continued on page 37

Work on New Dayton Air Post Starts Soon

THE scenes of the International Air Races at Dayton last fall is again assuming a center of interest and activity with the recent announcement from Washington that preliminary construction work on the new plant of the Engineering Division, Air Service would start May 1. Urban Thies, Government Architect, located at McCook Field is now deeply engrossed in a maize of blue-prints, architectural drawings, charts, miniature models, etc., in preparation for this preliminary work.

A representative of the Construction Division, Quartermaster's Office, is expected in Dayton soon to pass upon the final plans which have just been completed after several years of careful study and designing by Mr. Thies.

The permanent buildings will be after the special steel and concrete design adopted by the War Department. A group of Cantilever steel frame hangars designed especially by Mr. Thies for the Air Service will also be erected.

The Main Administration building, which will house the executive offices, will naturally represent the most pretentious and attractive structure, while the assembly, overhaul and other shops will be erected with a view both to saving and to afford convenience The warehouses and museum will require several additional buildings of extensive floor space the latter to require a prominent location for the benefit of visitors and engineers who have found the museum a source of valuable information.

New macadam roads and cement walks will be built along with a large cement apron and runway in front of the hangars. A railroad siding will be extended from the main Big Four Railroad line at a point near Fairfield.

A new Propeller Test Laboratory and Generator Power House will be constructed along with Transformer Stand, Heating Plant, Utilidor Wells, etc.

Congress has set aside $500,000 which was the initial expenditure asked for by General Mason M. Patrick, Chief of Air Service to cover preliminary construction work and moving costs. This first appropriation of funds

What New McCook Field Will Mean to Dayton Community

A minimum annual payroll of at least $2,500,000 (*The present McCook Field now has third largest payroll in Dayton*).

It will give employment to from 3,000 *to* 5,000 *skilled workmen within the plant and a possible* 3,000 *additional men in tool and machine shops, and other allied factories which will be attracted to Dayton in doing contract work for the Government post.*

It will mean the immediate building of many additional homes by employees of the post, who have until the present time generally refrained from purchasing real estate in the vicinity through the uncertainty in connection with the permanent retention of McCook Field.

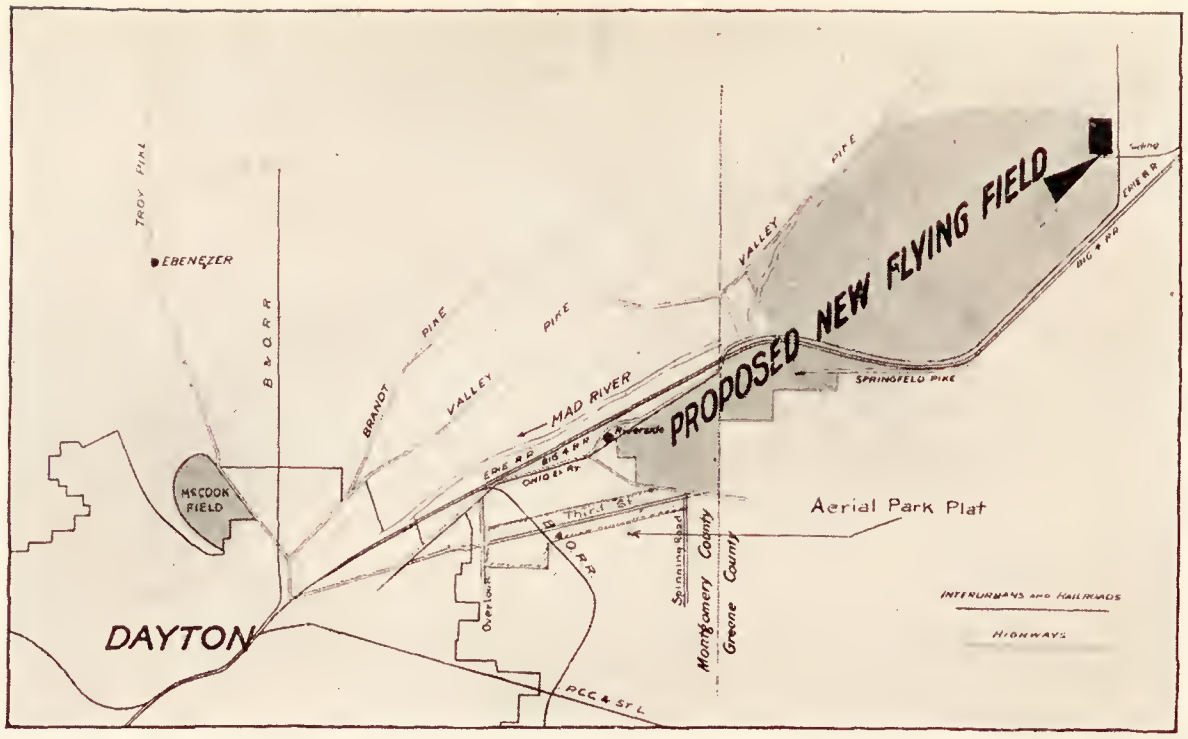
It will give Dayton the material facts for terming itself the "center of aviation" for with the greatest air station in the world now assured other commercial enterprises will be attracted here for convenience and prestige.

It will advance the educational opportunities of our younger generation in this newest and most important of sciences, and otherwise raise our civic standards.

It will attract the manufacturer of equipment and accessories for aircraft, together with the builder of strictly aircraft.

It will be splendid evidence of the progress and patriotism of Dayton people and turn the eyes of the world upon Dayton's leadership in this new industry which will no doubt alternately eclipse the history of the automobile.

The Curtiss Pursuit PW 8 — Highest Type of Speed Ship



Map Showing Location of the 5,000-Acre Tract Presented by Citizens of Dayton to Government to be Used as a Permanent Site for Mc Cook Field Engineering Experimental Station.

will be turned to the laying of streets, and roadways, installing sewers, draining, building foundations, and preliminary moving work from the present site of McCook Field at Dayton.

All construction work will be let out on bids to private contractors as is the custom of the War Department on such undertakings.

It is estimated that the total moving project will not exceed a cost of $4,000,000, which amount will be made available within the next two years.

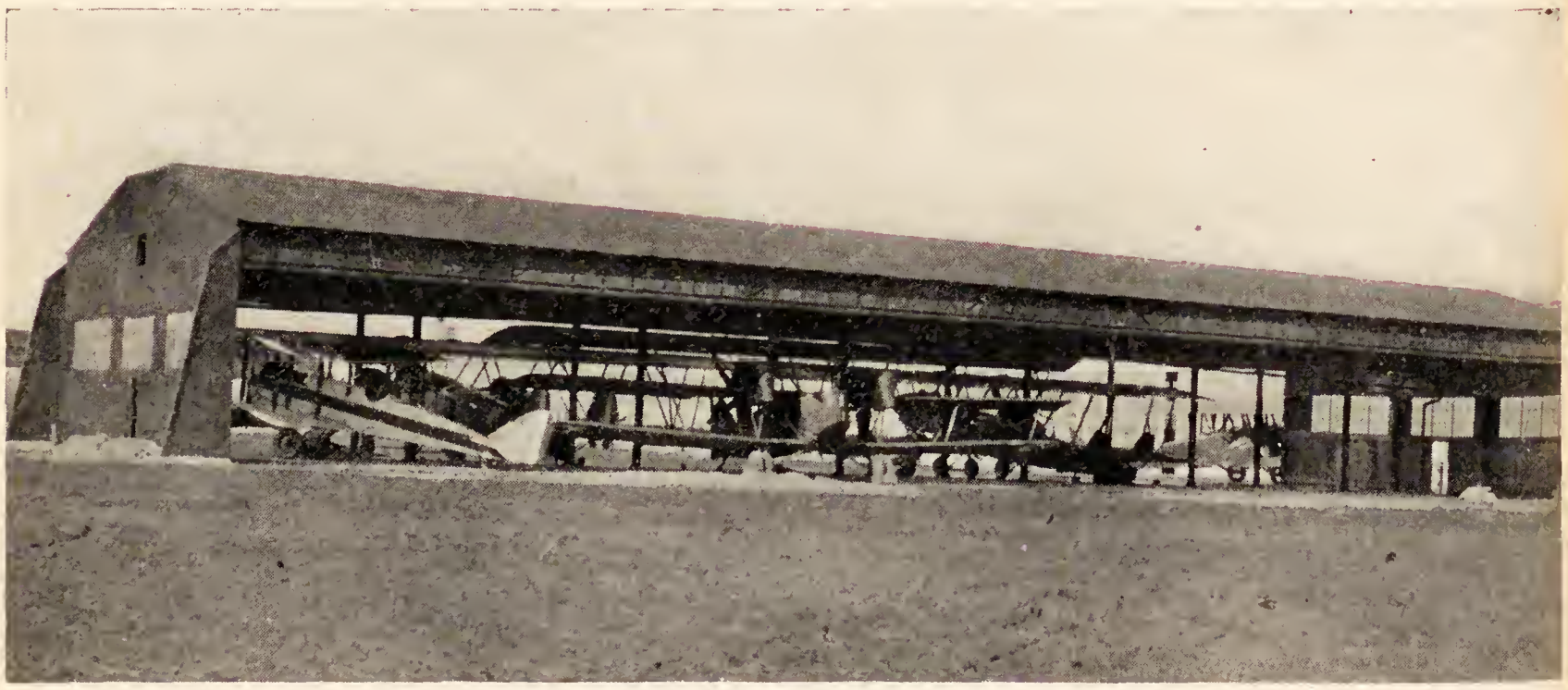
Had McCook Field been moved to a more distant point the expense of moving would have been four or five times as great, while an almost total disorganization of the personnel of the Engineering Division would have resulted.

The short move to the new site can be carried through with minimum cost and without disrupting a single phase of the important work being conducted at the McCook Field plant.

Dayton can soon claim the finest and largest Government Air Station in the world in the completion of the new McCook Field, just east of the city.

The Wright Memorial plot of twenty acres is located on a promontory overlooking the 5,000-acre flying field and the old Huffman Prairie, where the Wright brothers tested their first flying machine over twenty years ago.

It is the wish of Dayton people to erect upon this plot a Wright Memorial Building and improve the surroundings with landscape gardening, cement walks, stairways, etc., leading from the main road to the Memorial Building. The main highway would ultimately be transformed into a beautiful drive known as "Wright Boulevard" with direct access from the heart of the city of Dayton.



A new type of Cantilever hangar, designed by Mr. Urban Thies, McCook Field Architect, a number of which will be erected on the New McCook Field site east of Dayton, Ohio.

Making Flying Safe

By H. A. Bruno

Charles E. Colvin

IT is an unfortunate thing, in a way, that man is not endowed with the instinct of a bird. If he were the science of aerial navigation would be a simple one. It is generally known that aircraft, to be used successfully in peace or war, must be able to fly in fog, darkness, clouds, rain, snow, and so navigated that they always reach their destination.

How well this has been done is shown by our world flyers who were saved from disaster at least three times—in the North Pacific off Russian territory, between the Orkneys and Greenland and between Greenland and Labrador—by the use of Pioneer precision instruments. Lieutenant Maughan on his coast to coast, dawn to dusk flight and the pilots of the Shenandoah on their recent double transcontinental trip also relied on the same type instruments to guide them on their course.

The reports of these epoch making flights aroused one's curiosity, and in search of additional information let us travel to Brooklyn to visit the Pioneer Instrument Company which supplies the Army and Naval Air Services with instruments designed to make flying safe.

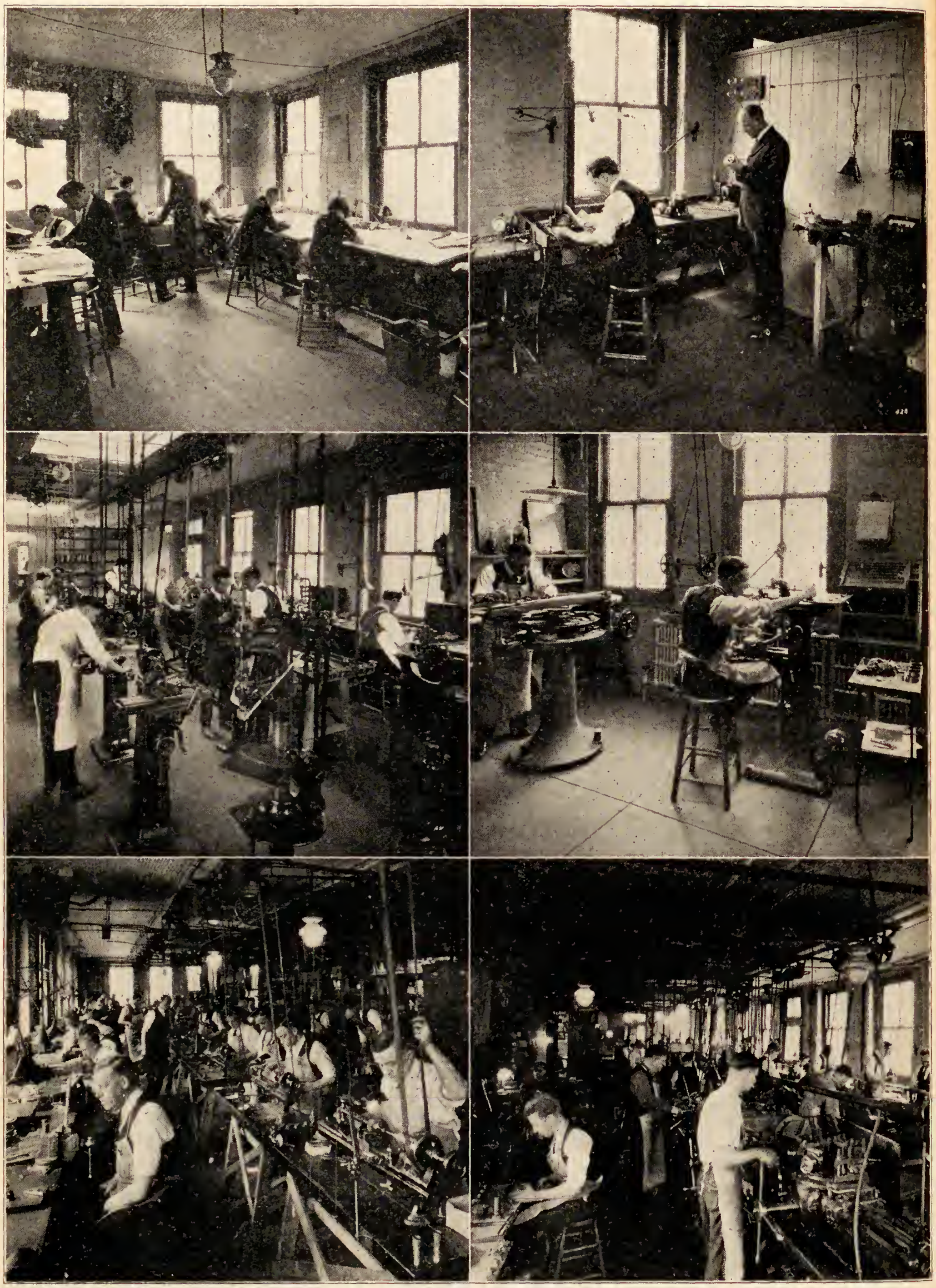
We find that the company occupies its own building. The ground floor houses the general, executive, purchasing, shipping and receiving departments, engraving and graduating room and Government Inspectors offices. The second floor is devoted entirely to parts manufacture and the third floor is used for experimental and development work. Here there is a drafting room, laboratory and experimental assembly and a painting and finishing department. The company also owns the adjoining building, which has a floor space of approximately 20,000 square feet. At the present time all the floors in this building are leased to various manufacturers, with the exception of the fourth floor which is used by the Pioneer Company for production assembly.

Of course, we wanted to know who started this business. It seems that the company dates back to 1919. Charles H. Colvin and Brice H. Goldsborough were its founders. On March 1, 1919, these two enterprising young men rented bench space in a fourth floor loft on Washington Street in New York. It cost them $4.00 a week. Goldsborough worked at the bench and Colvin, with his business literally in his hat, started out to find enough business to keep his partner busy. Uncle Sam was their first customer and they have well repaid him for his initial interest.

The business progressed, slowly but surely. They moved in August of the same year into a small shop on Greenwich Street, New York, where they built gauges and other instruments. On January 1, 1920, they were joined by Morris M. Titterington. The building on Greenwich Street was sold over their heads, and on June 1, 1920, they moved to Brooklyn, locating at 136 Havemeyer Street. Here the company stayed until August, 1923, when the present building at 754 Lexington Avenue was purchased. Today we find their operations enlarged so that they employ fifty-six people. There are Pioneer sales representatives in Washington, Los Angeles, San Francisco and the Orient, and manufacturing and sales representatives in Paris, France, and Milan, Italy.

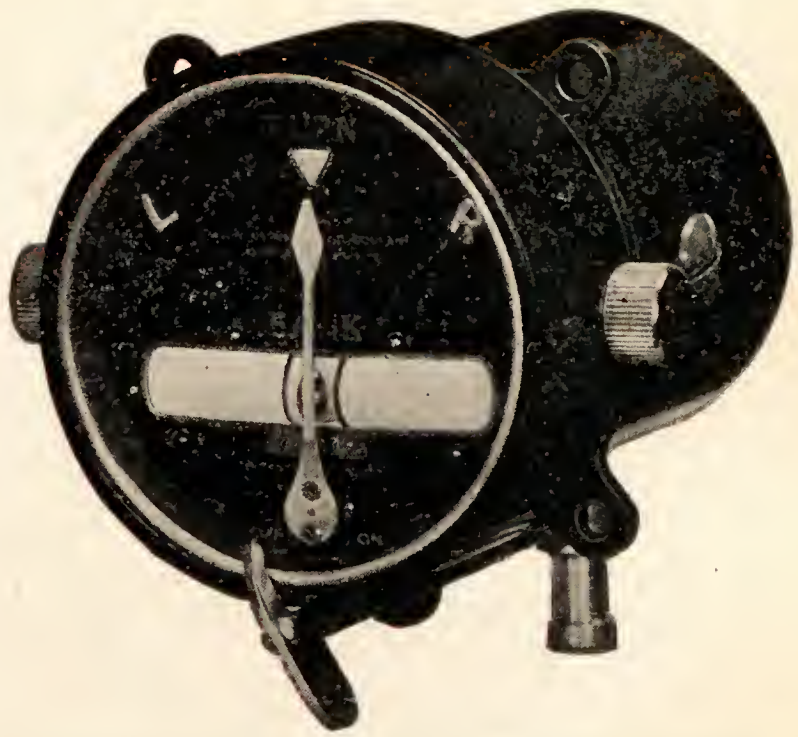
Morris M. Titterington

MORRIS TITTERINGTON was the first to realize that mere training and experience in flying would never give man the bird instinct and he turned to the invention of instruments of precision to aid flyers in fogs and clouds and make flying safe. He was particularly qualified for this work as he had been in aeronautics since 1911. In that year he built his own plane and attempted to fly with power furnished by a Ford engine. The machine finally crashed after one or two successful flights. He joined Glenn H. Curtiss at Hammondsport, N. Y., in 1913, and stayed with him until 1914. He went with the Sperry Company after leaving Mr. Curtiss, and in 1915, was sent to England and France in charge of that company's aeronautic work. When war was declared he returned to this country and was placed in charge of engineering and development work connected with aerial torpedoes. During



From left to right, top—Drafting room with Mr. Titterington and his assistant, Mr. Urfer in the background. (2) Experimental Laboratory. (3) Section of Third Floor—Mr. Bredermann, in charge of Assembly in center (black vest). (4) Mr. A. Comer, of Engraving and Graduating Room; at left, H. A. Brandis setting up job on high precision graduating machine. (5) The Parts Manufacturing Department. (6) The large Jones & Lamson flat turret lathe in plant of Pioneer Instrument Plant.

Pioneer Rate of Climb Indicator Valuable Instrument for Aircraft Navigation



The Pioneer Turn Indicator Standard Air Navigation Instrument

the war he did a large amount of experimental flying.

We understood that the Pioneer Company had recently developed several new precision instruments. The large amount of space devoted to invention, research and development partly prompts our curiosity in this respect. Mr. Titterington was quite willing to talk about his work and we learn that the company now controls, through patents issued and pending, a large number of aircraft instruments—among them being the Pioneer earth inductor compass, flight indicator, hand pump, fuel gauge and the newest instrument—known as a Periscopic speed and drift indicator. This latter instrument shows on the dashboard of the airplane the country over which the plane is flying and also enables the pilot to determine the amount of drift and actual ground speed. There is also a special Pioneer airspeed indicator for speed planes, which indicates up to 350 miles an hour. Inasmuch as planes have not as yet reached even 300 miles an hour, it can be seen that the instruments are away ahead of the present day development of planes. We learn that Charles H. Colvin is still the "go-getter" for the firm, and with this thought in mind, we visit the executive offices, leaving Titterington hard at work on still another new safety aeronautical device, the details of which he will not divulge.

Mr. Colvin was checking up a drawing for one of the very beautiful dials seen on Pioneer instruments. He stops to tell us that during the summer of 1913, he spent his vacation with the Curtiss Motor Company of Hammondsport, N. Y., and later with the Curtiss Aeroplane Company of the same city. In 1914, he graduated as mechanical engineer from Stevens Institute of Technology and joined the Speery Company; here he met Titterington and Goldsborough, the latter having recently finished an eight year term in the U. S. Navy. All three stayed with Speery until 1919.

"Do you find a good market for your instruments?" we ask. "Yes, with the Governmental Air Services," replies Mr. Colvin, "and the commercial demand for aircraft instruments is increasing to a very encouraging extent. Last year we sold about $12,000 worth of instruments outside of the government departments. Commercial flying will in time provide a good market, as instruments are absolutely essential to the maintenance of dependable flying schedules. The stock of Army surplus instruments, which seemed to be almost inexhaustible, has at last dwindled to a point where the end is in sight. As a result many of the commercial ships which are to be built this year will carry new instruments instead of 'war relics.' **The Driggs-Johnson Canary which is being built by the Johnson Airplane and Supply Company in Dayton, will carry Pioneer instruments and equipment.**

"You have been surprised at the large proportion of our plant which is given over to experimental and development work. Of course, most of our developments find their first installations in the Government Services, but in all this work we try to keep in mind the ultimate application of our devices to commercial aircraft.

"While we make every effort to give maximum service to the Government we do not regard aviation as 'a munitions industry.' We have instruments for every civilian requirement and expect that this part of our business will one day predominate."

Mr. Colvin insists that we go back to the experimental laboratory on the third floor. Once again inventor Titterington becomes our guide and we ask him for some specific information about his instruments, particularly those that have aided materially in making flying safe.

"Several instruments are required in order that airplanes may be flown through fog, clouds and darkness," said Mr. Titterington, "A turn indicator having a small gyroscope shows the pilot when his plane is turning, thus enabling him to fly in a straight line. A bank indicator shows him whether the wings of the plane are level.

"The earth inductor compass enables the plane to be flown on any desired course. The altimeter shows him the elevation, this being particularly necessary when flying over rough mountainous country where it is necessary to fly at a higher elevation than the tallest mountain in order to prevent collision.

"The rate-of-climb indicator shows the pilot how fast he is climbing or descending. It is an instrument of great importance in obtaining the greatest possible performance from any airplane.

"The air is likely to be flowing in any direction and is likely to change its direction and speed at any moment. This makes it impossible for the aircraft navigator to make allowance for the speed and direction of the wind, which would blow him off his course unless he has some means of determining the speed and direction of the wind.

"There are several instruments used for this purpose. One of them is the periscopic ground speed and drift indicator which I have already shown you.

"Before the advent of the earth inductor compass the only available compass for aircraft was an adaptation of the magnetic compass such as has been used for years on ships. In the earth inductor compass the part of it which determines the direction in which the plane is flying can be placed on the wing or in the rear of the fuselage or in any other location where there is no magnetic material in its vicinity to cause errors. The inaccuracies of the ordinary magnetic compass are therefore eliminated."

Before leaving the Pioneer building we met Miss Bessie Davis, secretary of the company. She too has grown up with the aeronautical business, having started with Speery away back in 1915, and joined the Pioneer Company in January, 1923.

All the inventions and developments we have observed come under the heading of pioneering, of making flying safe for everyone. It has taken inventiveness, engineering skill and determination to bring success to this company, commodities which Messrs. Colvin, Titterington and Goldsborough seem to have in abundance.

Columbus Aero Club to Build New Home

Starting its program of activities for 1925, the Aero Club of Columbus (Ohio), entertained with a formal Cabaret Dinner dance at the Elks' Home on Thursday evening, March 5, 1925. The number of guests totaled one hundred and fifty, all of whom attested to the success of the party, which was the fifth annual ball given by the club since its organization.

The unique invitation which was issued in advance indicated that uniforms could be worn, with the result that almost every branch of the service was represented. The variegated uniforms naturally added much color to the affair. All of the guests made reservations in advance so that each group was accommodated with a private table placed on the side of the ball room. The dancing which began at 9 p.m., was interspersed with four excellent vaudeville numbers. Dinner was served at 11 o'clock and dancing continued until 1 a. m.

The Aero Club's next social function of this kind will be staged at Norton Field on the occasion of the opening of the club's new home. Construction work will get under way within the next thirty days and should be completed in sixty days thereafter.

Remarkable Radio Test at Dayton Field

For the first time in history, on March 11, two McCook Field aviators—Major H. J. Knerr and Lieut. M. N. Stewart conversed with each other by radio installed on their planes which were flying more than five miles apart and several thousand feet high. They were also heard by ground stations. The test was made over Wilbur Wright Field, Dayton.

Bids For Bombing Job Opened at Dayton

Representatives of ten manufacturers were in Dayton during the week of March 1, to submit data and quotations on the contract to be let by the Government for the designing and building of a bombardment airplane from which specifications can be secured for a larger production order.

Bids were opened at McCook Field on March 12, with the following concerns placing bids: Charles Ward Hall Corp.; Eberhardt Steel Products Co.; Thomas Morse Aircraft Corp.; Huff-Daland Corp.; Lawson Aircraft Co.; Cox-Klemin Aircraft Corp.; Atlantic Aircraft Corp.; Kirkham Products Co.; Douglas Co.; and the G. Elias & Bros. Co.

Special Air Committee Upholds General Mitchell's View

On March 11, the Special House Air Committee issued a report which upholds the stand of Brigadier-General William Mitchell that the equipment and personnel of the Army and Navy Air services are deficient.

Anti-Aircraft Guns Prove Ineffective

The recent test of anti-aircraft guns against moving targets attached to airplanes off Fortress Monroe proved to reiterate the assertions of Brigadier-General Mitchell, and Eddie Rickenbacker, American war ace, that such methods of defense against air attack are ineffective. The guns were unable to hit the moving targets provided, nor were the six or more searchlights able to locate the "enemy planes" in the night sky until the aviators threw out flares to permit the ground forces to find them.

Recently the French pointed out that only six airplanes were brought down during the war by these defense weapons. The recent Fortress Monroe tests only furnished additional proof in favor of "aircraft as the sole means of combating aircraft."

Cincinnati Activities

Charles E. Lay, of Cincinnati, and builder of the "Dixie" passenger-carrying plane, reports that he has sold thirty planes during the past year in America.

Mr. Lay is now negotiating with Harold Moorehouse, of Dayton, who will soon place a new design 80-cubic inch light plane motor on the market. Mr. Heasel, who is associated with the Lay Engineering enterprise of Cincinnati, is now starting on a new two-seater light plane built around either the New Moorehouse, or Douglas motor.

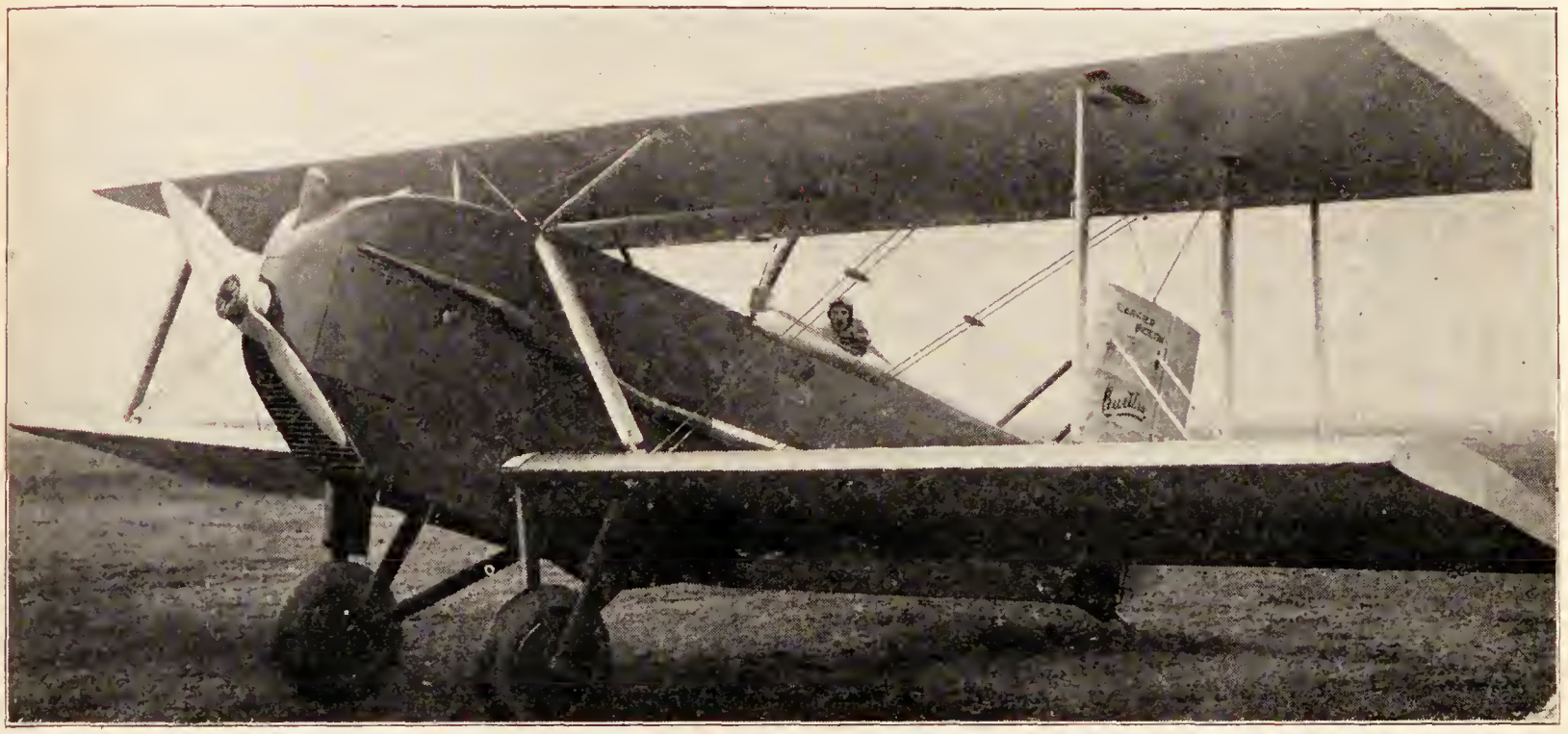
The present design of single place "Dixie" has proven too fast for the general United States commercial market, according to Mr. Lay, but is selling well in New Zealand, South America and Japan. He hopes that the new two-seater job will prove of popular favor.

It appears there is considerable dissension on the part of Cincinnati commercial aircraft operators toward the policies set down by the management of Grizard Field, the municipal airdrome.

"Only a select few, and transit aviators stopping off overnight are permitted to use Grizard Field, so the rest of us who want to sit round hereabouts must hunt a 'tater' patch of our own," says Lay.

The First "Flying Truck" for Air Mail

Curtiss "Carrier Pigeon"



The Curtiss "Carrier Pigeon" Commercial Plane, designed for Chicago-New York Air Mail Service.

Capt, C. S. Jones

THE increasing patronage of the transcontinental day and night Air Mail Service has forced the Post Office Department to endeavor to obtain cargo carrying aeroplanes having larger capacity which will be safer and more efficient than their present ships, the De Haviland, built originally for military purposes of a design now more than eight years old.

Realizing this need, the Curtiss Aeroplane and Motor Company has designed and produced the first plane in this country especially adapted for Air Mail use. It is called the "Carrier Pigeon." It carries half a ton of mail (40,000 letters) or parcel post or express packages. It is destined for operation on the night service between New York and Chicago, to be inaugurated by the Government sometime during the coming summer. Using the same power plant (the Liberty motor), it carries at a decreased expense and an increased speed twice the load carried by the present Air Mail planes. It will cruise at over 100 miles per hour, making the trip between New York and Chicago with but one intervening stop.

The "Carrier Pigeon" is a biplane having an exceedingly deep body, resembling the commercial motor truck. Its high speed is about 120 miles an hour and it will climb to altitude at the rate of over 1,000 feet a minute, reaching its service ceiling of over 15,000 feet, thus making it capable of easily surmounting the highest mountain range.

At the same time it will land at less than fifty miles an hour.

It carries 117 gallons of fuel, enabling it to fly 500 miles without stop. Fully loaded, it weighs two and a half tons, of which a little less than a ton may be termed useful load, consisting of 1,000 lbs. of mail, 700 lbs. of fuel, with an allowance of well over 200 lbs. for the pilot, his parachute and other gear.

Among the distinguished visitors invited to the Curtiss Field on Friday morning to see its initial performance were the Postmaster of New York City, Mr. J. J. Kieley, representatives of the Air Mail Extension Committee and the Aeronautical Chamber of Commerce, Mr. Carl F. Egge, General Superintendent of the Air Mail Service, with the Division Superintendents of the entire transcontinental service, and a number of Air Mail pilots, as well as Mr. C. M. Keys, President of the Curtiss Company, and a number of its directors.

The ship was rolled out on the line and its first load of Air Mail bags stowed away in its mail compartment. Piloted by Capt. C. S. Jones, in charge of Curtiss aerial operations, it rose easily into the air and after circling the field dis-

appeared on its first test flight.

"The most significant thing about this aeroplane," said F. H. Russell, Vice-President of the Curtiss Company, "is that the production by this Company of this purely commercial plane marks a turning point in American aviation. Since 1914, the aeronautical engineer and producer has devoted his efforts primarily to the development of military aeroplanes, for the commercial field has not warranted serious consideration. Today our Army and Naval Air Forces have the fastest and most capable fighting and observation planes in the world. The success of the Post Office in operating the Air Mail has created a public need for air transportation and from now on it may be expected that American aircraft builders will turn their attention to this field of development.

"The specifications offered by the Post Office were exceedingly reasonable, calling for a speed of 100 miles an hour, with a landing speed of fifty miles an hour, carrying a load of 1,000 lbs., using the Liberty engine. In the construction of this plane Mr. W. L. Gilmore, our Chief Engineer, and his assistants placed the details of safety, accessibility, maintenance and durability paramount over maximum air performance, although in this the 'Carrier Pigeon' easily exceeds the requirements of the Post Office.

"The body of the 'Carrier Pigeon' is built of steel throughout, using the Warren truss and eliminating the maze of wires found in older ships. The fuel is carried in a tank underneath the body, rather than alongside of the mail compartment, as in the older type ship. To minimize further the fire hazard, the tank is so installed that in case of accident a simple movement of a lever by the pilot will drop the tank with its fuel clear of the ship. It is also equipped with a fire extinguisher system which will instantly encompass the motor in its protected metal cowling, so that the slightest fire would be at once extinguished.

"The mail compartment, having a capacity of nearly sixty cubic feet, is located immediately behind the engine and separated therefrom by a fireproof bulkhead. Its location on the center of gravity of the ship leaves the plane in perfect balance regardless of the load carried.

"Special attention has been given to the comfort of the pilot. The seat, back and arm rests are all adjustable, ample provision being made for the parachute. The pilot's cockpit is located well back of the top wing and very high in the ship, affording him remarkable range of vision and easy exit from the ship by parachute.

"The landing gear of the 'Carrier Pigeon' is similar to that of the Curtiss military planes, having no cross axle or wire bracing, so that the ship can be landed in the roughest field or in brush without fear of nosing over. The tires are balloon type.

"The ship is provided with the Curtiss Reed metal propeller, which has been proved in Air Mail Service to withstand entirely rain or sleet or excessive heat. The plane is refuelled without the old-time difficulty, as the location of the fuel tanks is well within reach of attendants from the ground. A platform is provided in the wing and the mail compartment is opened from both the top and the side, making loading and unloading quite as simple as from a truck or car.

"I believe the Curtiss Company in offering the 'Carrier Pigeon' to the Post Office Department is providing a vehicle which will uphold the traditions of our Mail Service, so well expressed in the motto inscribed over the General Post Office in New York City.

> 'Neither snow nor rain nor heat nor gloom of night stays these couriers from the swift completion of their appointed rounds.'"

How New Osborne Retained the Fairfield Air Depot

By Morris D. Rice, Attorney-at-Law

Morris D. Rice,
Attorney-at-Law

THE idea of flying a machine heavier-than-air was conceived in the fertile brains of two youths of Dayton, who brought it forth to full fruition through their combined efforts expended very largely in their home community in the Miami Valley. Ever since then the activities of the airplane have been very largely centered around its birth place and it was the natural thing for the Government in emergency of the great World War to turn its attention to the location of a great airdrome in the Miami Valley—the birth place of aviation. The topography and climatic conditions in the Miami Valley are ideal for flying. Great stretches of level land, without obstructions thereon make landing safe for the pilot. The people of the community watched over aviation from its infancy and were sympathetic with it. The land was available at once without any controversy or delay. In its wisdom, the Government established Wilbur Wright Field and began the building thereof in May, 1917, and followed this activity with McCook Field. These Fields have been maintained and are now in full operation at Dayton.

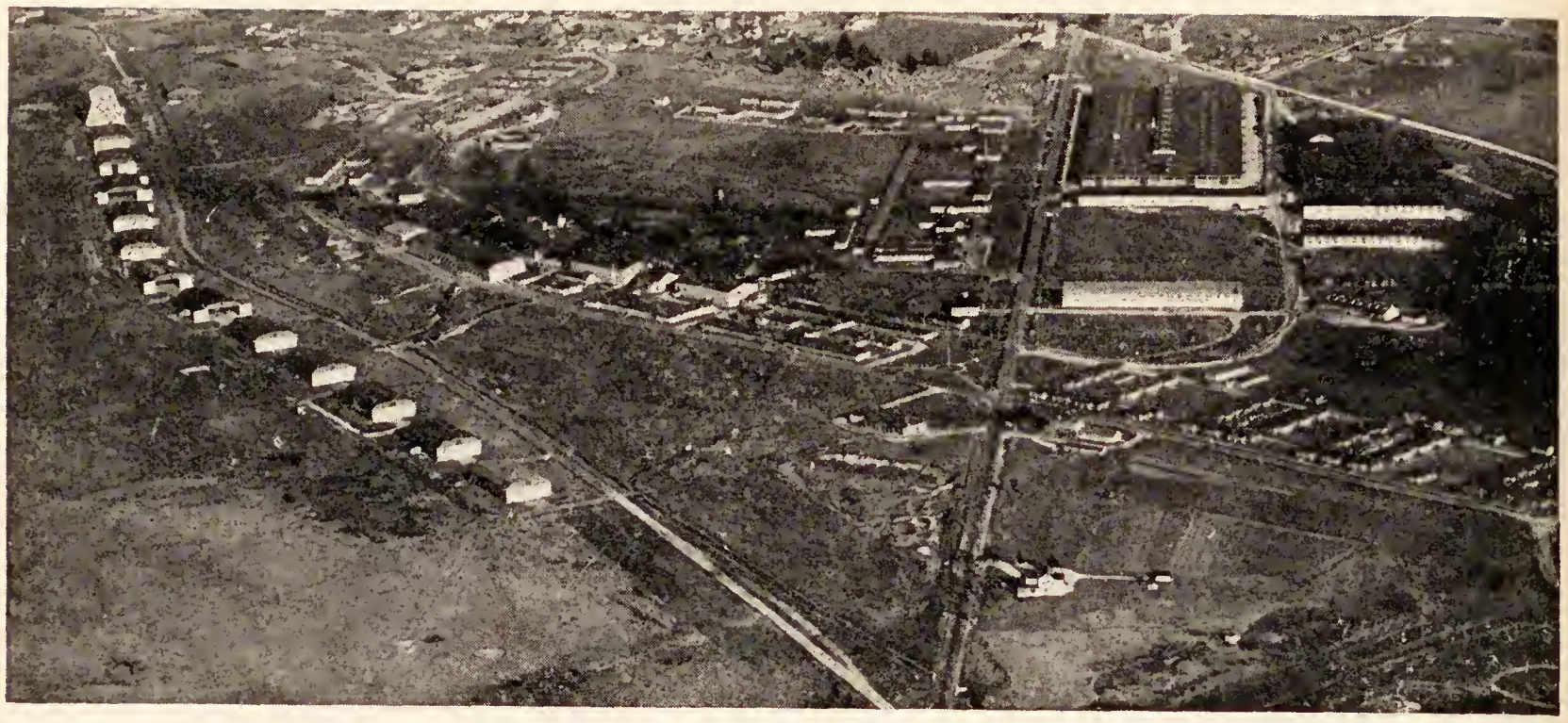
Some months ago it became apparent that McCook Field would have to be relocated because the area was too small and its use as a flying field was becoming a menace to pilots and the citizens of the community. The citizens of the Miami Valley at once provided at their own expense adequate area for its relocation, and donated such land to the Government in fee simple. The Government looked upon this matter carefully, and after due investigation accepted this donation, and Congress made an appropriation with which to begin the relocation of McCook Field. It seems probable that the work of this relocation will begin within the next sixty days.

Wilbur Wright Field has the largest supply depot in the world. Another supply depot is located at Middletown, Pennsylvania. Several flying fields are located along the Atlantic seaboard, and these fields, as well as the flying fields located in the insular possessions are supplied from either Wilbur Wright Field or the field at Middletown.

It is the policy of the present administration to economize wherever practicable, and that policy has been passed down the line to the army. Some months ago the Air Service division of the army came to the conclusion that it would be more economical to combine the supply depots of Wilbur Wright Field and the one at Middletown by moving the Wilbur Wright Depot to Middletown, thereby practically abandoning Wilbur Wright Field without a definite program for its future, unless it would be the removal of Rantoul and Chanute Fields, of Illinois, to Wilbur Wright Field, thereby abandoning those Fields. In line with this conclusion, the Air Service asked the Budget Bureau to recommend an appropriation for the removal of the supply depot from Wilbur Wright Field to Middletown, which recommendation was made by the Bureau and had the approval of the President.

On February 2, 1925, some of the leading citizens of Osborn, near which village Wilbur Wright Field is located, learned for the first time that the removal of the supply depot of this field was about to become a reality. A self appointed committee from this village hastily examined into the matter, and concluded that the move was unjustifiable from several viewpoints, but especially from an economic and strategic standpoint. Steps were at once taken to crystallize its views into action. Senators and Congressmen were appealed to with strong argument against the proposed move, and there were furnished to Senators Willis and Fess, of Ohio, and to Congressman Brand of the Seventh Ohio District, in which Wilbur Wright Field is located, briefs against the proposed removal. The views of this committee as set forth in the briefs furnished, argued for the retention of the Field from a patriotic, economic and strategic view point.

It was argued that the Air Service had mistaken in their conclusions, and that a thorough investigation of the whole matter should be made before a move of such magnitude should be made. That the saving claimed for such removal was only a "paper saving," and as a matter of fact such removal would mean a loss in dollars and cents to the Government. That Wilbur Wright Field is the largest and best airdrome in the world, containing approximately five square miles of Government-owned flying land, a part of it being recently donated to the Government by patriotic citizens of the Miami Valley, sur-



Aerial View of Fairfield Air Intermediate Depot at Wilbur Wright Field, near New Osborne, Ohio.

rounded by fifteen square miles of level land, admirable for flying purposes, making it the safest field in the country, whereas the field at Middletown is small and not favorably located for flying purposes.

The supplies at Wilbur Wright Field are housed in a permanent structure especially adapted for such use, erected at a cost of one million dollars. This building could not be used for any other purpose without expensive alterations. Either the abandonment or alteration of this building would mean a large economic loss. All the necessary utilities are already installed at Wilbur Wright Field, while at Middletown extensive remodeling to the buildings would be necessary before they could be used for a depot and a heating plant and utilities would have to be installed before that depot could be used, all at an enormous cost.

Wilbur Wright Field is admirably located for shipping facilities, being on the main lines of the Big Four and Erie, with one and one-half miles of trackage laid with side tracks extending into the buildings. It is near the center of population, and only one night's ride by rail from the large cities east of the Mississippi River.

The retention of it on the present site would save $550,000, the estimated cost or removal. It is quite probable that the expense of removing this field would exceed by many thousand dollars the estimated cost of removal, all of which will be saved.

The policy of the Government should be to locate its supply depots inland, rather than to move nearer the seaboard. Wilbur Wright Field is now approximately five hours' flying distance from the seaboard with the Allegheny Mountains between it and the seaboard. Middletown is approximately one hour's flying distance from the seaboard, and is east of the Allegheny Mountains, thereby making it an easier prey to the enemy.

The air depot is centrally located at Wilbur Wright Field and serves the first seven army corps areas with repairs. It adjoins the site on which the engineering division experimental station now at McCook Field will be permanently located, and now furnishes that field with sixty-two percent of its supplies.

It is located in the center of engineering, mechanical, industrial and manufacturing region, which is noted for producing instruments of precision and for furnishing an excellent supply of high-grade mechanics. In the event of war, the Government would be in need of thousands of airplanes and would turn to the automotive industry to manufacture them. The center of the automotive industry is in Ohio, and to move Wilbur Wright depot would move the supplies farther away.

If our only supply depot were located at Middletown, within an hour's flying distance from the seaboard, one of the first things to be done upon getting into another war, would be to move the depot farther inland, and this at a time when the attention of all hands should be focused upon other matters. It is presumed that another war is expected, or else why all this preparation?

It is to be sincerely hoped that the Air Service will expand to a size commensurate with the size of this Nation and its interests. The logical direction of expansion is westward from strategical, political and economical standpoints. Several fields are already located in the East, and the Government will not grant the establishment of additional ones there from the standpoint of national safety.

This locality has ideal health conditions with low death rate—among the lowest in the country. The citizens of this vicinity are educated to the value of aviation, are sympathetic with it, and have demonstrated their willingness to cooperate with and support the Air Service in every detail. Lastly Wilbur Wright Field was the scene of the Wright Brothers' early experiments. and sentiment should influence the Government to keep it for Air Service activities.

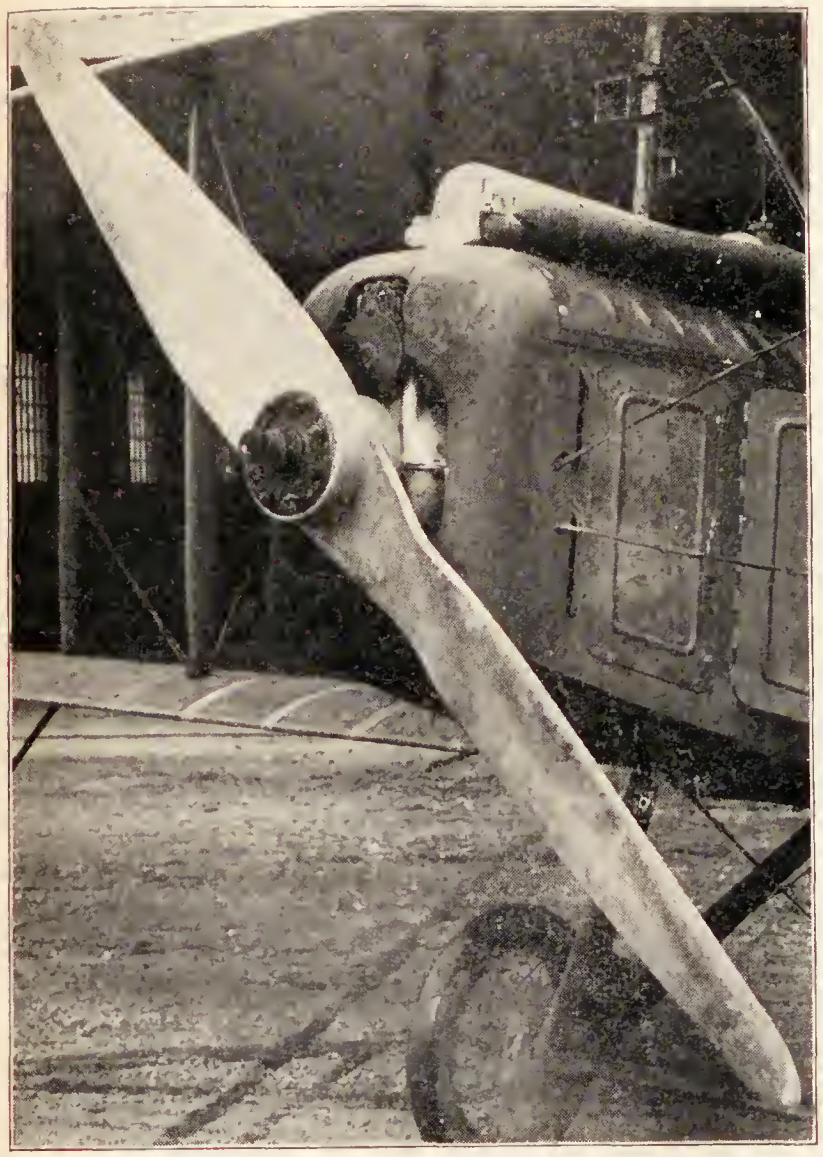
These arguments and others not set forth here. convinced the Committee on Appropriations in the House of Representatives that no appropriation should be made for the removal of Wilbur Wright Field. It cannot be moved without funds for that purpose. So it remains in its present location at least for the time being. It is devoutly hoped that the Air Service in its wisdom will see the logic of letting it remain for time to come.

San Diego Foremost Pacific Air Base

An aerial taxi service was inaugurated March 1, between Los Angeles and San Diego, California. Land planes are used exclusively on this line. The initial passenger list was composed of prominent movie stars. San Diego also recently gave birth to a new aeronautical magazine known as "The Aeronautical Review." The publication is edited by A. K. Spencer.

Kelly Field Officer Succeeds General Mitchell

Colonel James Fechet, Commanding Officer of Kelly Field, San Antonio, Texas, was recently named by Secretary Weeks to succeed Brigadier-General William Mitchell as Assistant Chief of Army Air Service. Colonel Fechet, a native of Texas, entered the army as a private in 1898, and is well thought of in the Army Air Service. General Mitchell expressed the opinion that Colonel Fechet "is a good man and will no doubt take a conscientious stand for a more adequate air defense."



First Magnesium Propeller a Success

The first flight of an airplane using a single piece magnesium propeller was successfully inaugurated February 6, at Curtiss Field, Garden City, Long Island New York, when M. M. Merrill, test pilot of the Curtiss Aeroplane & Motor Company, Incorporated, flew a J-1 standard equipped with a Curtiss C-6 motor in the initial flight test of the propeller.

Sometime ago the propeller was given a ten hour whirling test with 100 percent overload (300 H.P.) on the McCook Field block. These tests prove that magnesium alloy has the physical qualities necessary for propeller construction.

Professor S. A. Reed, inventor of the famous Curtiss-Reed Duralumin Propeller is also responsible for this new feature of aircraft development. The propeller will be marketed under the same condition as the Duralumin propeller.

Decatur Aviator Builds Light Plane

Bert Bachstein, who flew his "home-made" plane to Dayton last year during the International Air Races, announces that he has built a new plane of the single-seater type.

The little "Baby Scout" is equipped with a Harley-Davidson motorcycle engine with a direct drive, and developing between 12 and 15 horsepower.

It has a wing span of 18 feet and an overall length of 14 feet.

Weight loaded, 375 pounds. Weight empty, 225 pounds. It is fitted with a five-foot propeller of Mr. Bachstein's own make and design.

The maximum speed of the little ship is 70 miles per hour, cruising speed, 50 miles per hour, landing speed 25 miles per hour.

Mr. Bachstein is also planning to build a light plane of monoplane design and using two Harley-Davidson engines.

Our Cover Designs

No doubt readers of Slipstream have lately been attracted to our beautiful Cover Designs.

We have lately contracted with the Hasenstab & Sayer Studios of Dayton, Ohio, to do this work and other art for Slipstream Monthly.

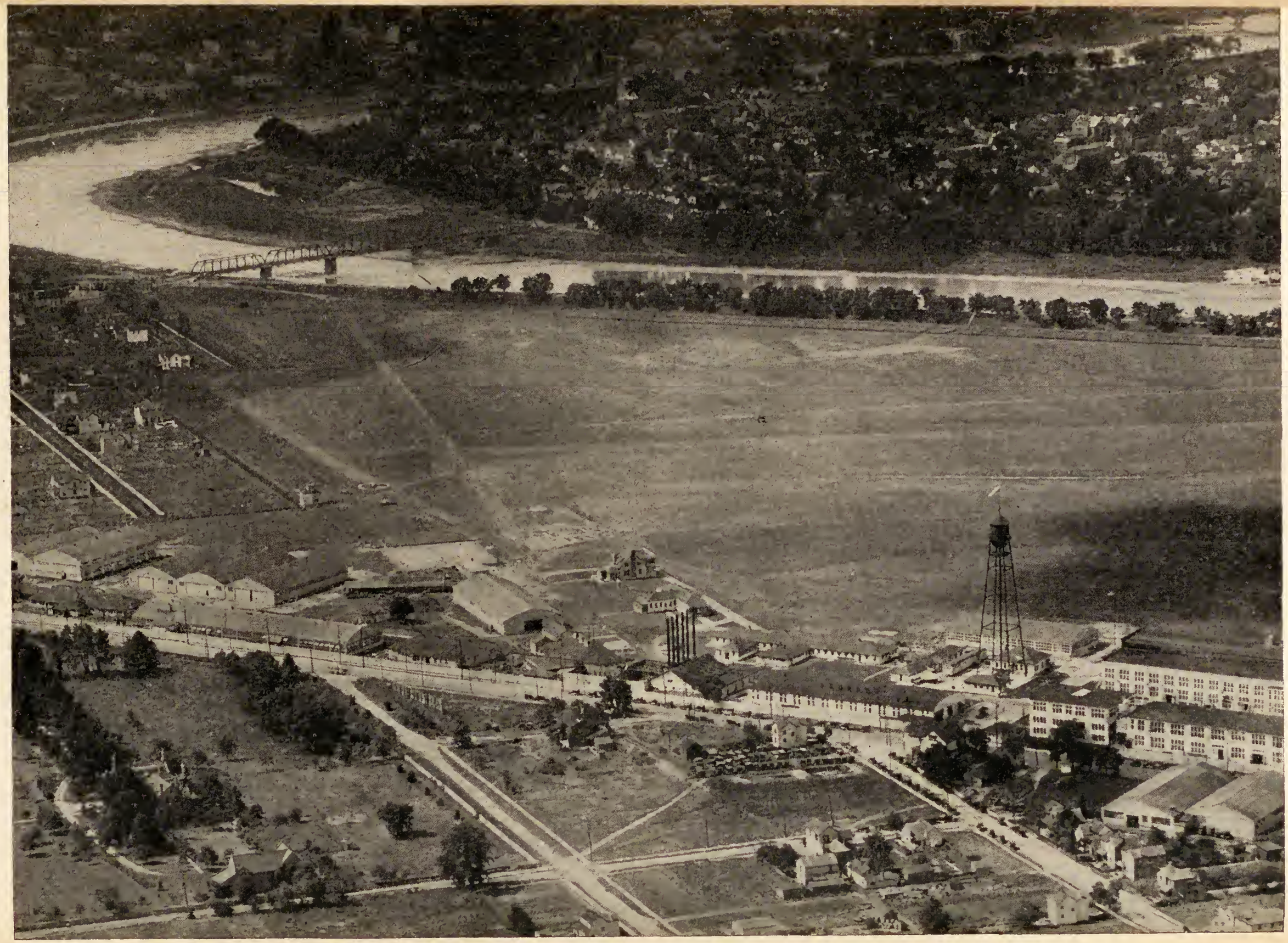
The members of this firm are veteran artists in the commercial field and have built up a broad clientele among the industrial concerns of the Miami Valley. Slipstream Covers will furnish a good sample of Hasenstab & Sayer work and they invite all persons interested in commercial art to give them an opportunity to figure upon contract work.

Loening Amphibian Receives Universal Praise

From all parts of the world Grover Loening veteran designer of airplanes is receiving felicitations as a result of his new amphibian ship, a number of which will likely be purchased by the United States Government.

The use of an inverted Liberty motor was brought into striking effect in the new craft. Nothing has yet been seen in this country to equal the novel way in which Mr. Loening has fitted the Liberty in the neat cowling.

These late photos of the ampribian were handed the editor of Slipstream by Mr. Loening during the latter's visit to Dayton in conjunction with the flight tests of the ship at McCook Field. The ship was recently flown overland from New York by Lieutenant Wendall Brookley; a unique accomplishment in the histor of American aeronautics.



Engineering Division, Army Air Service, McCook Field, Dayton, Ohio, soon to be moved to new quarters east of the city. This beautiful flying field, although too small for experimental flying tests is ideal for a municipal airdrome. The Johnson Flying Service, Incorporated, a Dayton firm, expects to acquire this field for commercial purposes.

McCook Field Accomplishments of Past Year

By JOHN F. CURRY, Maj. A. S.
Chief Engineering Division.

Major J. F. Curry, A.S.

THE engineering achievements of the air service for the year (1924) must necessarily be confined to a brief review of only the most outstanding accomplishments. First, because the multiplicity of projects under development cannot be adequately treated in such a limited space, and second, because military secrecy precludes to some extent their detailed exploitation.

In order to give a clear conception of this multiphased progress in engineering and research, it is necessary to further limit the discussion to a few characteristic achievements which show the trend of aeronautical development. Before proceeding, however, it might be well to cite the fact that the achievements of the engineering division in interpreting, translating and passing upon the needs of the air service are not always directly apparent but are reflected in a large measure in the new aircraft material submitted by the industry.

For convenience, the technical activities are discussed under six main headings, namely, airplanes, airships and balloons, armament, equipment, materials and power plants. In addition, a conclusion is appended containing a few items of general interest.

AIRPLANES

During 1924 more than 25 new experimental airplanes of various types were built by the industry for test at the division. Only one airplane, an observation type, was designed and constructed by the division. This project was carried on for the purpose of exemplifying certain new ideas in design and metal construction for use as a basis in judging future development of a similar type.

The most remarkable advance in airplane development during the year has been in performance, particularly as typified in the exceptional high speed and maneuvering of the Boeing and Curtiss pursuits, both of which have been placed in production. No other nation has anything comparable with them. A similar characteristic advance in performance and design is noted in the new observation types submitted toward the close of the year. In this class the gain in speed and maneuver ability is even more commendable for the reason that these airplanes were built around the war-time Liberty engine, whose possibilities in increased performance had been considered exhausted. Advance design in bombardment aircraft is typified in a new type of twin-engined night bomber in which increased visibility and bomb capacity are the two outstanding features.

TWO NEW TYPES

Two new types entered the field during this period. First, the world cruisers, whose epochal flight around the world will go down in history as one of the most brilliant aeronautical achievements of the age, were completed in a remarkably short time, due principally to the close liaison between the engineering division and the manufacturer. The second entrant in the field was an entirely new type built around the inverted Liberty engine—an amphibian for operating from either land or water. This airplane showed exceptional adaptability for its class and was the first amphibian to be built for the air service.

Production has been directed principally toward the rehabilitation of the present standard observation plane, the DH-4B. Many of these airplanes are being entirely rebuilt to incorporate metal fuselage and improved equipment so as to provide the air service with a more safe and reliable service airplane until more advanced types can be obtained.

The drop-forged aluminum alloy propeller has come into favor, due to the marked increase in performance resulting from its use. Its adaptability is excellent in that the same propeller can be used on different airplanes ranging in speeds from 90 to 140 m. p. h. by merely changing the blade setting. Interchangeability has been introduced in the detachable blade, split-hub propeller using blades of steel, micarta or aluminum alloy. This type of construction permits the blades to be quickly replaced in case of injury.

NEW PROPELLER BUILT

A split-hub propeller with detachable blades of magnesium, a new light alloy weighing only two-thirds as much as duralumin, has been built and tested at the division. So far as it is known, this is the first propeller to be built of magnesium.

Balsa wood, a tropical wood lighter than cork, has played a conspicuous part in the construction of large propellers for use in propelling airships with geared engines. Propellers 17½ feet in diameter, built up with balsa wood core covered with thin mahogany plywood, have withstood whirling tests satisfactorily.

In the study of aerodynamics, new methods have been evolved for computing loads and determining stresses in airplane structures that will aid designers in the

more efficient use of materials. This information has been disseminated to manufacturers through the medium of specifications and handbooks.

AIRSHIPS AND BALLOONS

Lighter-than-air activities were directed toward the early completion of the RS-1 airship, the largest semi-rigid ever built in this country. This airship, designed for the use of helium, has a volume of 720,000 cubic feet and measures 282 feet in length, 73 feet in greatest width and 93 feet in height. The total lift is 41,250 pounds, of which 11,220 pounds is useful load. The high speed is estimated at 70 miles per hour, and the ceiling at 10,000 feet, propulsion being furnished by four Liberty dirigible engines driving two 17½-foot Balsa propellers through dual unit transmissions.

After an extensive research, the division has developed and tested with promising results a new type of barrage balloon which is capable of ascending to an altitude of 15,000 feet through use of collapsible lobes which automatically provide for the expansion of gas. Experimentation is still in progress on this project.

MOORING SIMPLIFIED

Mooring and ground handling of airships and balloons have been greatly simplified by the development of the "Grab-winch," a caterpillar tractor vehicle capable of chasing the drag rope and thereby maneuvering the airship without the help of large ground crews. The highly mobile balloon winch has also been developed to the production stage. This transportation unit presents a great improvement over the present service types in that it can rapidly haul down an observation balloon in the field under service conditions while traveling over rough terrain.

The bombing contests of the past year (1924), have again demonstrated the efficacy of the new engineering division bombsight now in production. Its accuracy with either fixed or moving targets has now been definitely established, and so far as it can be determined this accuracy stands unparelleled by any foreign development.

DEVELOPMENT OF RACK

The advent of the 4,000-pound bomb required some suitable means of carrying it. Hence, followed the development of a special lightweight, high-strength external rack capable of carrying either the 2,000 or 4000-pound bomb with perfect safety.

New internal racks have also been constructed for installation in the new night bombing planes, which were received during the year. These racks have a capacity for 2,100 pounds of bombs.

A new arrangement of machine guns has been devised for attack aviation airplanes. This consists in mounting two fixed guns, manipulated in the same manner as synchronized guns, on the lower wing of an airplane out of range of the propeller so that the line of fire is in the direction of flight. Another innovation in manipulating machine guns in the tail or floor of the airplane provides for a remote control or device by which the gunner can direct the fire of these guns without leaving his seat.

A new method of signalling which possesses many advantages over the Very pistol is employed in the new pyrotechnic projectors which are built directly in the side of the airplanes where the pilot can conveniently discharge the pre-arranged signal cartridges through an individual tube.

INDUCTION COMPASS

Gunfire tests on bullet-proof glass have shown that material in proper thickness can be used effectively to replace the rotating vision wheels employed in present ground attack aircraft.

During the past year the induction compass has proved successfully as a distant-reading compass. The reliability of this compass, which depends upon currents induced by the interception of the earth's magnetic lines of force, has been established beyond question on numerous cross-country flights and in the world flight. The defects which still exist are due to discrepancies in material and workmanship which can be worked out later in production. The induction compass, when supplemented by a drift sight and flight indicator, gives a reliable combination for long distance flights without recourse to landmark navigation.

The night air mail and night airways service have been made safe and practical through development of complete systems for the electrical illumination of airdrome and airplane. Further improvement of airdrome lighting equipment is now in progress whereby the incandescent searchlight will replace the arc searchlight as an aerial beacon and floodlight. Lighting layouts have been made in order that the principal flying fields of the air service may be illuminated as fast as equipment and funds become available. Improved airplane landing lights of greater candlepower and beam divergence have been perfected to further aid the pilot in night landing.

PHOTO ACHIEVEMENT

For the first time in the history of aerial photography a successful photograph has been taken with a single-lens camera from an altitude of 32,000 feet. The value of this achievement at this high altitude, which is well beyond the range of human sight and hearing as well as the range of anti-aircraft guns, becomes of paramount importance from a military standpoint. This particular photograph includes 19 square miles of territory, depicting almost the entire city of Dayton, Ohio, with remarkable clearness and represents the greatest area ever included in one exposure with a single-lens camera.

In connection with this achievment an interesting comparison of area photographed by single lens and multi-lens cameras is presented. If photographs had been taken from this altitude with the engineering division tri-lens (Bagley) mapping camera used in geological survey, the area photographed would have included 95.2 square miles of territory! with the four-lens camera 130.6 square miles, and with the five-lens camera, the most recent development, 166 square miles.

PRODUCE PHOTO TRUCKS

Several photographic trucks, which constitute motorized laboratories for developing and printing aerial photographs in the field, have been produced for use in liaison with observation squadrons in the zone of action. Their use in peace-time photographic missions ought to be of inestimable value.

Much progress has been made in metal construction as applied to the structure of both the wing and fuselage of the airplane. New combinations of steel and duralumin have been successfully utilized in the design of wing spars and ribs which are lighter and stronger than those made of wood.

Another accomplishment in material research which has done much to increase the strength-weight ratio of aircraft materials has been the development and application of the light alloys of aluminum and magnesium to engine parts. The immediate results of the use of light alloys is manifested in the power-weighted ratios of the newer engines which show a substantial reduction in weight of more than 0.6 pounds per horse power over the two-pound per horse power Liberty.

The use of aluminum-magnesium alloys has also been applied to the construction of instrument cases, camera mounts and other aircraft accessories with substantial reductions in weight.

POWER PLANTS

At present, both army and navy air services are relying upon the Curtiss D 12 water-cooled engine for pursuit purposes the development of which has extended over the past five years. The reputation of this

engine has been firmly established by its performance in the Curtiss racers and in the new pursuit airplanes recently constructed for the army air service.

From present indications, the pursuit engine of the future will be centered about two newer and lighter types of water-cooled engines new under development by the Curtiss and Packard companies. The new designs embody an improvement over the present D-12 engine to give greater output at no increase in weight. One of these engines, recently manufactured by the Packard company, is capable of delivering 510 horsepower at a weight of 710 pounds or at less that 1.4 pounds per horsepower.

LIGHTER ENGINE

For bombardment aviation, the large 18 cylinder "W" type engine developed by the air service two years ago has been superseded by a smaller and lighter engine of equal horsepower due to the advance in design and use of lighter alloys. Before the conservative "W" type engine which came up to its predicted performance in every respect could be gotten into service, it was evident that commensurate results could be obtained with an engine of lighter construction. Among the engines of this class in the new Wright T-3, 650-h. p. engine and a new Packard model under development.

The Liberty engine, modernized and improved through experimentation and substitution of new parts and accessories, has again proved its reliability as a service engine in the consumation of the world flight. Its operation in an inverted position has also drawn considerable interest and resulted in new installations affording greatly improved visibility for landing and maneuver as well as in simplification of the fuel system and increased accessibility of the engine itself. Other promising modifications of the Liberty engine which are still experimental is the geared model with its 2 to 1 reduction and the new air-cooled model in which the standard Liberty cylinder has been replaced by a new type of air-cooled cylinder developed by the Division.

AIR-COOLED ENGINE

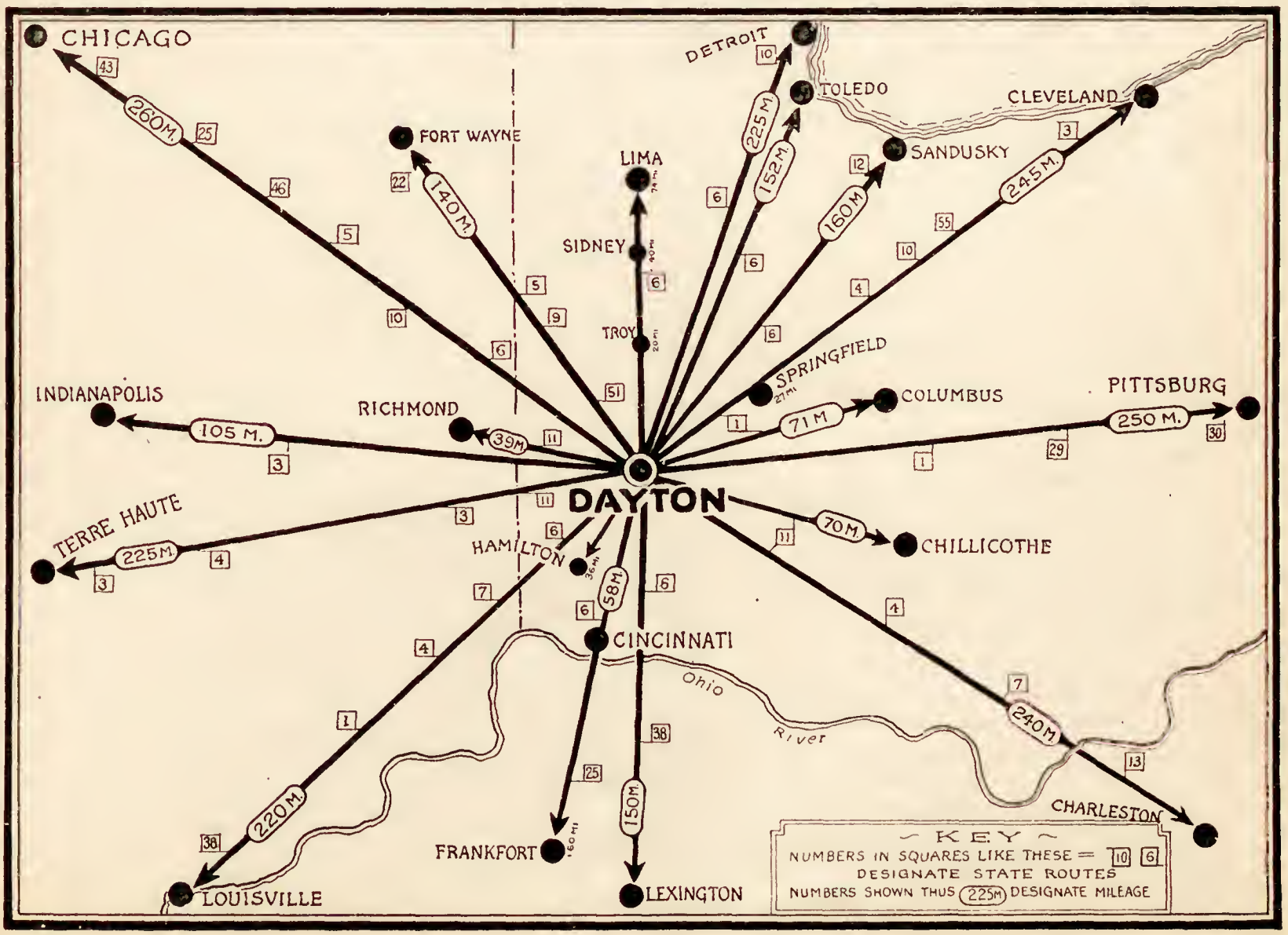
Up to the close of the World war, no air-cooled engine of the fixed radial type had ever been built in this country whereas in foreign countries this type of engine had already been developed with apparent success. As a forerunner of the large radial engine which many engineers considered a mechanical impossibility, the air service first undertook and successfully completed a small fixed radial for training purposes. The development of the large 350-h. p. engine then followed. The success of the project depended mainly upon the efficient cooling of the large bore air-cooled cylinder, the development of which has been brought to a highly practical state by the Division.

Although the weight per horse-power of the air-cooled engine is greater than that of the water-cooled engine, when considered upon the basis of total installed weight, the air-cooled engine shows up more favorably. For strictly high speed service, the air-cooled engine is not considered as satisfactory as the water-cooled type, but it nevertheless poossesses a flexibility in rapid climb and maneuver that is of primary importance in certain types of aircraft.

The new and unique aircraft power plants are under development under supervision of the Division. One is the Almen "barrel" type 18-cylinder water-cooled engine with cylinders parallel to the crankshaft and the other a new air-cooled radial utilizing a cam mechanism in place of the conventional crankshaft and connecting rod. If these types prove successful, the present design of aircraft will be revolutionized around powerful compact engines weighing close to one pound per horsepower.

FEATS OF INTEREST

Supercharger development has been characterized by a change from the nose type turbo-super-charger to the side type which is installed on the side of the en-



gine beneath the cowling. This reduces frontal parasite resistance to a minimum. After much experimentation, it is now believed that the gear-driven supercharger is entirely feasible, and that excellent performances can be expected from the experimental designs now under test.

Aside from the purely technical phases of aeronautical development, several feats of unusual interest may be cited in conclusion of the year's (1924) activities.

The first momentus project was the preparation for the world flight. The important part of this work entrusted to the engineering division covered the conditioning of all the Liberty engines used in the flight and the installation of special navigating equipment such as the induction compass, drift sights, aerial sextants, smoke bombs, refueling pumps and other pertinent accessories to aid the fliers in their hazardous journey.

DAWN-TO-DUSK

The next epochal project successfully consumated was the first transcontinental "dawn-to-dusk" flight made last June by Lieutenant Maughan in the Curtiss Pursuit. The total distance of 2,760 miles from Mitchel field, Long Island, to Crissy field, California—from the Atlantic to the Pacific—was covered in the daylight of one day over an elapsed time of 21 hours and 50 minutes, of which 18 hours and 38 minutes were spent in flight at an average speed of 148 m.p.h.

The military significance of this engineering feat is interpreted as demonstrating the possibility of concentrating pursuit aircraft at any point in this country within 24 hours in case of emergency.

A regularly scheduled weekly airways service has been maintained during the past year between important flying centers for the rapid transportation of air service personnel and other urgent government business. This service embraced close to 50,000 miles of daylight flight between the various fields—Mitchel field, New York; Bolling field, Washington; Langley field, Virginia; McCook field and Fairfield service depot, Ohio; Chanute and Scott fields, Illinois, and Brooks and Kelly fields, Texas.

ABOUT NIGHT FLYING

The first regular night airways in the world have been inaugurated as a result of experimentation and perfection of electrical equipment for the illumination of airdromes and the night landing of aircraft. The equipment has been developed by the division or by manufacturers under its supervision, has been adopted practically without change by the United States night air mail service. The success of the night airway definitely establishes the fact that night flying is a commercial success as well as a military necessity.

Several weight-carrying records for duration and altitude have been established during the year. Noteworthy among these are the ones for altitude and duration made by the Barling bomber, after a thorough reconditioning, which carried a load of 4,000 kilograms (8,800 pounds) to an altitude of 4,472 feet (1,363 meters) and sustained this load in flight for a period of 1 hour, 41 minutes and 10.4 seconds. Of equal significance are the new altitude records made by the supercharged engineering division TP-1, which reached altitudes of 28,143 feet and 29,562 feet with loads of 500 and 250 kilograms, respectively. Records for altitude and duration were also established by the twin-engined supercharged NBS-1 bomber, which succeeded in reaching an altitude of 16,250 feet with a load of 1,500 kilograms, and also in maintaining a similar load in flight for a period of 2 hours, 13 minutes and 48.6 seconds. Another record for duration was made in the Douglas DT-2 in which 250 and 500 kilograms were carried for a period of 9 hours, 11 minutes and 53.8 seconds. All records were made by engineering division pilots and have been homolgated as official world's records by F. A. I.

Directional flight in aerial navigation has been materially aided by two recent developments still in the experimental stage—the induction compass and the radio beacon, the latter a system of raido signals by which the aviator can maintain a straight course for a distance of 200 miles or more. Personal safety in flight has been greatly increased through the perfection of the air service parachute, which has so far never failed in cases of emergency.

Whichita Chapter, N. A. A., Observe Tests on New Travel Airplane

The National Aeronautical Association, were requested by the Travel Air Manufacturing Company, to observe and check flight test made with OX-5 90 H.P. Travel Airplane.

The following tests were made March 13, 1925, with OX-5 90 H.P.. three place commercial airplane built by the Travel Air Manufacturing Company, Wichita, Kansas. Were officially observed by us and we do hereby certify and swear that they are correct to the best of our knowledge.

Three speed trials were taken on measured courses with one passenger and pilot. The average speed of these trials was 96 miles per hour.

The next test was for useful load, take off and climb.

The total useful load being 1,119 pounds, take off 451 feet, climb with the load to 500 feet, 2 minutes 3 seconds, climb with pilot and one passenger 1,000 feet, 1 minute 6 seconds.

These loads and measurements were weighed and measured by us and are absolutely correct.

(Signed) CY. SEYMOUR,
President.
A. R. SCHNEIDER,

VIRGINIA BOMEN,
Notary Public
Cosmission expirts July 14, 1928.

"Smiling Jack" Makes Fine Talker

Latest information received by the editor of Slipstream from Louis J. Alber, well-known manager of Lecture Celebrities, who is handling the Harding-Thomas "Round-the-World Flight" lecture tour, would indicate that the undertaking is a complete success. "The show is going over in fine shape," states Albers, "and Jack is coming along splendidly and has the making of a real talker. Thomas, of course, is a past-master. We are getting very fine reports from everyone."

The show, which includes a fine run of moving and still pictures of the "Round-the-World Flight" by the American aviators, began in Nashville, Tennessee, March 2.

"Smiling Jack" Harding was the mechanic who accompanied Lieut. Erik Nelson with the New Orleans World Cruiser. Lowell Thomas, who assists Jack in the lecture tour is the well-known historian and travelogue writer who compiled the official story of the great flight.

On March 1 the show had made the following bookings:

	Appearances		Appearances
Buffalo, N. Y.	2	Detroit, Mich.	4
Jamestown, N. Y.	2	Ann Arbor, Mich.	2
Mayville, N. Y.	2	Flint, Mich.	2
Alliance, Ohio	2	Bay City, Mich.	2
Newark, Ohio	2	Lansing, Mich.	2
Zanesville, Ohio	2	Grand Rapids, Mich.	2
Canton, Ohio	2	Kalamazoo, Mich.	2
Cleveland, Ohio	3	Battle Creek, Mich.	2
Toledo, Ohio	2	Albion, Mich.	2
Cincinnati, Ohio	2	Saginaw, Mich.	2
Nashville, Tenn.	2	Chicago. Ill.	2
Knoxville, Tenn.	2	Springfield, Ill.	2
Bristol, Tenn.	2	Tri-Cities, Ill.	2
Atlanta, Ga.	2	Danville, Ill.	2
Chattanooga, Tenn.	2	Des Moines, Ia.	2
Daytona, Fla.	2	Ottumwa, Ia.	2
Winston-Salem, S. C.	2	Omaha, Nebr.	2
Charleston, S. C.	2	Milwaukee, Wis.	2
New Orleans, La.	2	Green Bay, Wis.	2
St. Peterburg, Fla.	2		

Who Said Anti-Aircraft Guns Are Not Effective?

It is obvious that if Mr. Ireland, cartoon ist for the Columbus, (O.) Dispatch was still on aetive duty as an offieer n the army when this illustration was published he would by this time be doing "Squads east and west," as a Buek Private in the rear rank. Happily Billy Ireland did his bit during the World War and is now privileged through the freedom of the press to put in another lick for Democraey and Justice. General William Mitehell, Assistant Chief of Air Service was reeently demoted to rank of Colonel for having "said what he thought" concerning the Army and Navy Departments. Officials of the Army and Navy Departments said what they thought about the Air Service and still hold their rank. We know that the people were with General Mitchell in his stand. It is strange therefore that we people (who are supposed to constitute the Government) must watch meekly the demotion of an offieer who has represented the only living inspiring figure in our rapidly deteriorating air defense.

Concerning 1925 Air Meets

The Open Meeting of the Contest Committee, National Aeronautic Association, which was called by Chairman Orville Wright, January 29, had the following present at roll call: Orville Wright, Chairman; B. Russell Shaw, Vice-Chairman, Contest Committee; C. F. Schory, Secretary, Contest Committee; Major H. A. Dargue, War Department.; Lt. Com. M. A. Mitscher, U. S. Navy; Dr. W. R. Gregg, U. S. Weather Bureau; W. R. Snyder, Department of Commerce; F. H. Rusell, Manufacturers' Aircraft Corporation; C. G. Peterson, P. G. Zimmerman, S. A. E.; E. P. Warner, Wallace Kellett, Arthur Halsted, Charles Lawrence, Captain O'Neill, Colonel Gilmore, U. S. Army; W. D. Tipton, T. Joyce, and M. Brombacher.

The purpose of the meeting was to discuss desirable contests and other aviation activities coming under the jurisdiction of the Contest Committee of the N. A. A. for 1925.

Jacques Schneider Trophy Race

Baltimore will be the scenes of the 1925 Jacques Schneider Cup Race event. Last year the contest was cancelled at the last moment with the failure of foreign entries to be present. Both, Great Britain and Italy, have signified their intentions to enter the 1925 contest. San Diego, and New York City were after the event but Baltimore was recommended particularly because they had gone to so much expense in preparing for the Race last year. It was found that New York was not sufficiently organized at the time to make an immediate decision, while it was the general opinion that European contestants would not favor San Diego, considering that it would be necessary for them to ship their planes from the Atlantic sea coast to the Pacific, after having come from overseas. A suggestion was entered that the Curtiss Marine Trophy Race be held in conjunction with the Jacques Schneider Cup event but the Baltimore representative, Mr. Tipton, stated that they did not wish to conduct any other races in conjunction with the Jacques Schneider. The contest will be held the latter part of October, at Bay View Park, near Baltimore.

Curtiss Marine Trophy Race

This event was held at Miami, Florida, last year but the Chamber of Commerce of this city decided to go in only for purely aquatic events this year and to stage a more popular Curtiss Marine Trophy event in 1926.

In order to stimulate interest in aeronautics on the west coast it was the feeling of the meeting that San Diego should stage the Curtiss Marine Trophy Meet. No contests of national importance have ever been held on the Pacific coast for a number of years.

This Race, which has heretofore been a closed meet for Navy pilots and Navy planes, will be made a free-for-all speed event this year. The meet will be held some time in November.

Liberty Engine Builders' Trophy Race

There are indications that would point to an entirely different type of race under the "Liberty Engine Builders" heading for 1925. Several new ideas were offered toward making the race more popular from the spectators' point of view or more valuable as to demonstrations in development of the particular types.

A contest for Corps' Observation planes after the manner of the event which proved so popular at the St. Louis Races was suggested, along with an "Inter-City" contest which would be conducted after the fashion of the "Tour of France," whereas, for instance, a pilot might fly from Los Angeles to San Francisco and return; the speed per mile, the number of miles flown, the number of passengers, the fuel economy, etc., would all be taken into consideration. It was pointed out however, that "Inter-City" events are hard to organize and that it would not tend to attract people to a central point which means so much when one must have a source of raising money to conduct the whole scheme and pay out cash prizes to the winners.

Light Plane Competition

A displacement limit of 80 cubic inches was decided upon for single-seater light plane events for 1925. Two-seaters were not definitely restricted, due to lack of sufficient development in this type. However, 160 cubic inch engines for two-seaters seem to have favorable consideration. Superchargers were considered from various angles. First it was thought best to prohibit the use of supercharges altogether but it was finally agreed that "nothing but good would result if some constructor could win a race with a super-charged engine." In other words it would merely demonstrate that he had the better engine.

Super-charged engines are yet a bit unreliable and the fact that some contestant chose to risk one ought not to scare other contestants out of the race.

Pulitzer Trophy Race

It is still uncertain who will get the 1925 International Air Race event. Kansas City and Wichita, Kansas, are making concerted bids for the big meet, while Minneapolis and St. Paul, who earlier expressed a desire to stage the meet have virtually lost their former enthusiasm as expressed in their local newspapers.

With France, now holder of the World Speed Record, there is a good chance for foreign entries to take part in the 1925 meet. It is probable also that there will be some new United States speed planes to compete for the Pulitzer trophy this year.

Ralph Pulitzer, in a letter read by Mr. Shaw at the meeting, objected to the plan of raising the landing speed requirement over the 75-mile-per-hour mark.

The objection of foreign engineers toward sending their models to the United States for wind tunnel testing is now eliminated with the provision that foreign contestants can now conduct their tests at any approved wind tunnel and the results forwarded to the N. A. A. Diving starts will not be permitted this year in the Pulitzer Race. The N. A. A. has forwarded a petition influenced out of recent catastrophies in "diving" starts, for consideration at the next F. A. I. conference.

The International Air Races will be held this year either during the last week in September or the first week in October.

A Correction

We have received a communication from B. Russell Shaw, Executive Vice-Chairman, Contest Committee, National Aeronautic Association, calling our attention to an error appearing in our February issue. In an article under the heading of "1925 Aero Events Outlined," the impression was given that the meetings of the Contest Committee, N. A. A., held January 29-30, were directed or "headed" by Mr. Shaw.

We are therefore glad to have the opportunity here to acknowledge the error and explain that the meetings were directed by the new Chairman, Mr. Orville Wright.

Noted Member of New Firm Sends Editor Cordial Letter

Mr. Fred Marshall, March 12, 1925
Slipstream Publishing Co.,
401 Beckel Building,
Dayton, Ohio.

Dear Fred:

I certainly appreciated your kind letter of the 9th inst. I intended to see you in Dayton before I left, but you can well realize how busy I was at the time. Of course I'm going to be down there quite often in the future, so really I haven't bid goodby, and it is only necessary to bid you au revoir for the time being.

I was very glad to note your fine expressions with regard to Fred Flader. I am expecting him the latter part of this week.

I will attempt to get you information for a story about our company in the near future. We have not definitely decided just what plane we will build at this time for commercial work, but we will surely let you know when we do decide.

My family has not moved to Detroit as yet, but I expect to have a place ready for them next month. Believe me, I am certainly getting anxious to get settled down again to my regular home cookings, and to have my little family with me again. It was very hard to leave all my good friends in Dayton, but I am hoping to see them occasionally in Detroit.

Don't forget, Fred, my latch string is out, and I am certainly looking forward to the time when you will be kind enough to pay us a visit.

With best personal regards, I am,

Your old friend,
A. V. Verville.

A Little Friendly Dig

The Slipstream Pub. Co., Huntsville, Ohio.
401 Beckel Bldg., Feb. 28, 1925.
Dayton, Ohio.

Dear Sirs:

I am very much enjoying SLIPSTREAM, a subscription to which was presented to me by The Johnson Airplane & Supply Company.

But I cannot restrain the impulse to offer a little criticism of your comment on airplanes in the February issue. Your remarks are not unfavorable for the WACO cabin job, but you go into endless detail in your praise of the Stout "Air Pullman."

What I want to know is this. Since the WACO carries the same number of passengers, uses but half the horsepower, takes off in half the distance, climbs twice as fast, has double the maneuverability and lands in half the space, uses little more than half the housing space, costs probably one-third as much to build and has a fineness of perfection, both inside and out, that the Stout has not approached why is it that you offer most of the credit to the Stout design?

The WACO has a great appeal and is greatly admired by those who are looking for the practical, but the Stout Air Pullman only strikes them as a white elephant (and is less graceful in appearance).

Why not allow the credit to go where it is deserved, whether the company in question is backed by a thousand dollars or ten million?

I am,

Very sincerely yours,
George C. Plummer, Aviator.

Due to the cramped condition of this issue of *Slipstream Monthly* it is necessary for us to carry over until April the current installments of the serial article by Ivan H. Driggs on "Light Planes" and that of "A brief Review of the Aviation Indutry of the United States," by the Editor. The "Light Plane" serial, when completed will be issued in the form of a Technical Bulletin by the National Advisory Committee for Aeronautics, Washington, D. C.

Continued from page 14

Manager J. W. Pettit; Chief of Service, Walter T. Varney; Secretary, A. L. Murphy; Treasurer, W. L. Rothschild; Construction Manager, Hal Bruntsch. Operations of the Taxiplane service will begin April 5.

Just out of Philadelphia at Bryn Athyn the firm of Pitcairn Aviation, directed by F. Pitcairn is inaugurating an air taxi service to all eastern cities and also instructing students in flying. At Erie, Pennsylvania there was recently organized a new Aero Club comprised of some hundred members most of which are former air service pilots. This organization intends to start a flying school and do commercial air business.

In Columbus, Ohio, the Columbus Aero Club has revised activities with a recent banquet to increase membership.

In Decatur, Illinois, the Decatur Aircraft Company was recently formed with W. S. Thompson, former veteran test pilot for Curtiss, along with Robert L. Ward of Decatur comprise the members of the firm. They have both land planes and a flying boat and will do general commercial air field business.

Tips & Smith of Houston, Texas, are having a rush on airplane supplies from their large stores and recently announced having acquired an important license to convert Rotary Engines to Radial Type. In the future they will divert much of their time to this work. Since there is a scarcity of good motors for light planes this will no doubt develop into a profitable and flourishing phase of business. There is a surprising amount of "home-made airplane"building being done at this time throughout the country, members of Tips & Smith firm state. Another new Houston commercial aviation firm launched into existence recently with the announcement that The Houston Aerial Transport Company, had inaugurated a new flying field close to the city. This concern is heralded as one of the most modern and largest commercial flying fields and flying schools in the southwest and will carry on a regular passenger-carrying schedule through Texas and other neighboring states. Aerial photography will also be handled by the new firm. V. V. Hayes is General Manager and Royal Copeland Assistant Manager.

In Akron, Ohio, Zeppelin building is soon to take on a material aspect with the completion of designs and construction plans. The Goodyear-Zeppelin Corporation heralds some big things in the Dirigible Airship field and Akron is agog with interest in aviation development.

Cincinnati will open a new and better Air Field in the spring with a hope to have the Air Mail extend its services to their city and thence southward to New Orleans and westward to St. Louis.

Johnson Airplane & Supply Company of Dayton, Ohio, will go into an even broader phase of commercial work than in former years. Recognized now as the leader among strictly commercial aircraft concerns in this country they expect to add several new planes to their large assortment for use in passenger carrying and flying school work.

With the recent announcement of the Flying School scores of applicants have appeared to take up the course of flying instructions under the able tutoring of veteran pilots. It is planned by the Johnson firm to take over the present McCook Field site when this post removes to the new site east of Dayton and maintain here the largest flying school in the world. The Johnson firm represents a pioneer in the commercial line and their methods have been extensively studied of late by the many new organizations which are going into the field.

The Johnson firm will also go into the manufacturing business with the production of the novel 3-place commercial plane known as the "Canary" and modeled after the Driggs-Johnson light plane which won the Light Plane Competition at the International Air Race Meet held in Dayton, in the fall of 1924. This ship will sell for $2,500. Photographs and performance specifications will be distributed to all prospective buyers, upon request.

Thus we have aimed here to give merely a brief outlay of developments which come to our casual attention We have by no means listed all of the important things that indicate rapid strides in commercial aviation. These few facts however, will serve to bring home the truth of things. The day of profitable commercial aviation is now upon us. The many failures of three and four years ago have been overshadowed by the greater number of successes during the past year. The opportunity in this field is now being sensed by thousands of wide-awake corporations and individuals who are getting in on the ground floor.

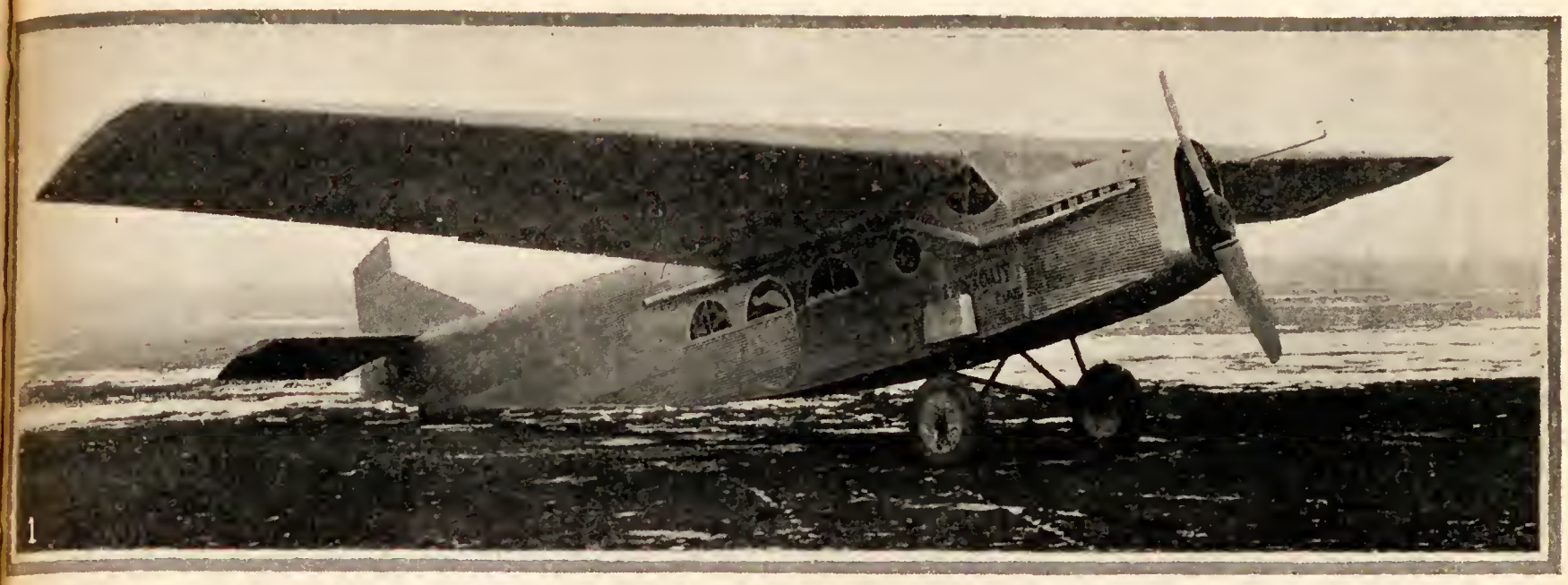
* * * * * * * *

Perhaps General Mitchell may be able to find another job after all.

The Lawson firm recently secured Walter H. Barling, designer of the famous Barling Bomber, as Chief Engineer. Mr. Barling accompanied Alfred W. Lawson to Dayton, where, in an interview with a representative of Slipstream it was disclosed that the Lawson firm was very desirous of locating a factory in Dayton for turning out both military and commercial aircraft.

"New York, although one of the leading commercial centers of the world, would be the first spot to be attacked in time of war. In this way all manufacturing activities centered there would be paralyzed," remarked Mr. Lawson.

It will be remembered that Mr. Lawson in 1919 perfected the Lawson airliner equipped with two Liberty engines and capable of carrying twenty-six passengers. It is his wish to establish in Dayton a factory for building a similar airliner to be placed in operation on the proposed New York-Dayton-Chicago commercial air route.



"Miss Detroit" First Metal Air Pullman

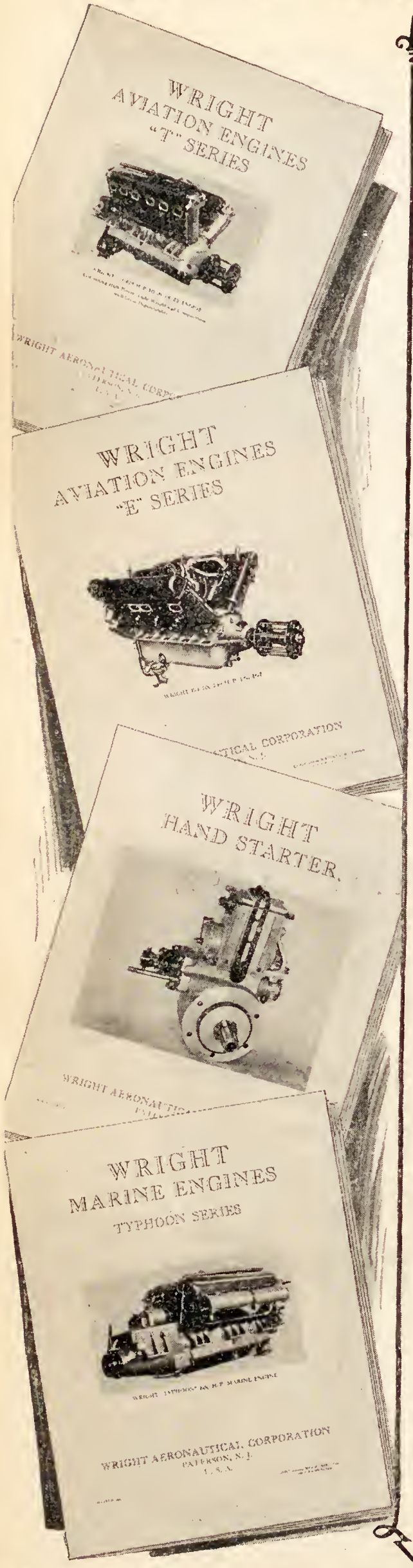
Stout Metal Airplane Co.

DETROIT, MICHIGAN

The Air City

When visiting Detroit via air, set down at Ford Field, Dearborn, Detroit's Municipal Airdrome

FACTS ABOUT WRIGHT ENGINES



The eight bulletins illustrated describe the outstanding features of the entire assemblage of Wright Aeronautical Engines and the two Wright Marine Engines whose performance has become famous since they were placed on the marine market. Both marine and aeronautical bulletins contain power curves, weights, installation drawings, specifications, definite performance guarantees and facts that indisputably point to leadership in the engines' particular power range.

The air cooling advantages described in J-4 and L-4 bulletins are of especial interest. In all these bulletins the detailed accurate information given on the design and building of engines since the war will prove of unusual value. So thoroughly are these presented in each bulletin that it is suggested you write for all.

Fair Prices
Prompt Deliveries
Definite Guarantees
Warranted against Defects

WRIGHT AERONAUTICAL
CORPORATION
PATERSON, N. J., U.S.A.

WRIGHT ENGINES

CONTACT!!

MILITARY

2000 Air Service Officers
65 U. S. Air Stations
16 Foreign Military Attaches
85 Army Posts in U. S. and Possessions
1500 Governement Employees
500 Employees in Aircraft plants
60 Air Mail pilots, mechanics, employees
40 Military publications
200 Contractors to U. S. Governemens
60 Foreign Aircraft Representatives
100 Naval Officers

CIVIL

100 Libraries
200 Chambers of Commerce
40 Aero Clubs
60 Chapters, N. A. A.
900 Industrial Leaders
60 Radio Broadcasting Stations
800 Airplane owners, operators or contemplative builders
40 Universities and Colleges
400 Students
100 Engineering Clubs and Societies

Airplane Pilots and Mechanics know the importance of the sharp signal of "Contact!" given when the propeller is spun by hand to start the motor.

To Aeronautical people who are interested in the Aviation Magazine from the advertisers point of view the extent of its importance should be ascertained by the extent of "Contact" the publication commands with the Industry and Allied Interests.

Born in Dayton at the most important U. S. Governement Air Experimental Station six years ago Slipstream established there a unique and intimate contact with both the civil and military phases of aeronautical development which places it in the foreground of authority and prestige.

Slipstream is a growing Magazine, the Aircraft Industry is likewise growing. The one needs the other to stimulate this mutual growth.

GET OUR ADVERTISING RATES

SLIPSTREAM PUBLISHING CO.

401 BECKEL BLDG., DAYTON, OHIO

Introducing

The 3-Place OX-5 "Canary"

A Better Airplane Built for Commercial Purposes!

A Better Airplane and Why!

Built to Aeronautical Safety Code factors.

Steel construction throughout except Wings.

Comfortable Passenger Compartment with ample Doors for entrance and exit.

Wide-Split Axle Landing Gear and steerable Tail-Skid insuring better controlability on the ground.

30-Gallon gravity feed Fuel System.

The quick getaway, exceptional performance and wonderful maneuverability as shown in recent tests prove that "The Canary" IS a better airplane.

We will extend the utmost courtesy and consideration to those seriously interested. Call or write for complete descriptive data.

JOHNSON AIRPLANE & SUPPLY CO.

DAYTON, OHIO., U. S. A.

ABOVE ALL
BETTER AIRPLANES
JOHNSON
DAYTON
OHIO

SLIPSTREAM

April
1925

Commercial Aviation Number

Published in
DAYTON, OHIO
"Center of Aviation"

HASENSTAB STUDIOS.
DAYTON, OHIO

$2.00 PER YEAR

25¢ PER COPY

Progress in Industry is the result of constant improvement

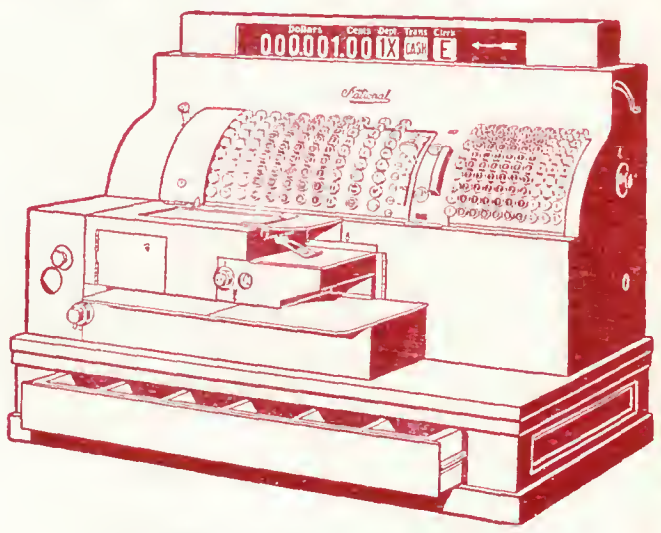
YEARS of research, hundreds of new inventions, thousands of improvements, have made the airplane what it is today.

The same story could be written about National Cash Registers. For forty-one years our Company has been constantly changing, improving and adding new features to its product.

National Cash Registers are built to meet the needs of every business everywhere.

Merchants all over the world have helped to make our product the best of its kind. Over 500 styles and models, ranging in price from $75 and up are the result of their suggestions.

This is why we guarantee to furnish a better cash register, for less money, than any other concern in the world.



Highest Type National Cash Register

The National Cash Register Company

Dayton, Ohio

A Curtiss Hawk Pursuit Plane powered with a Curtiss D-12 low compression motor. These machines have a speed of 175 m. p. h., a ceiling of about four miles and a cruising range of about 450 miles.

Ready to Hop from Zero to Zephyrs

AVIATION had another successful test recently when a group of Curtiss Hawk Pursuit Planes hopped from zero weather at Selfridge Field, Michigan, to the balmy zephrys of Miami, Florida. Considerable importance was attached to the flight because of its military significance.

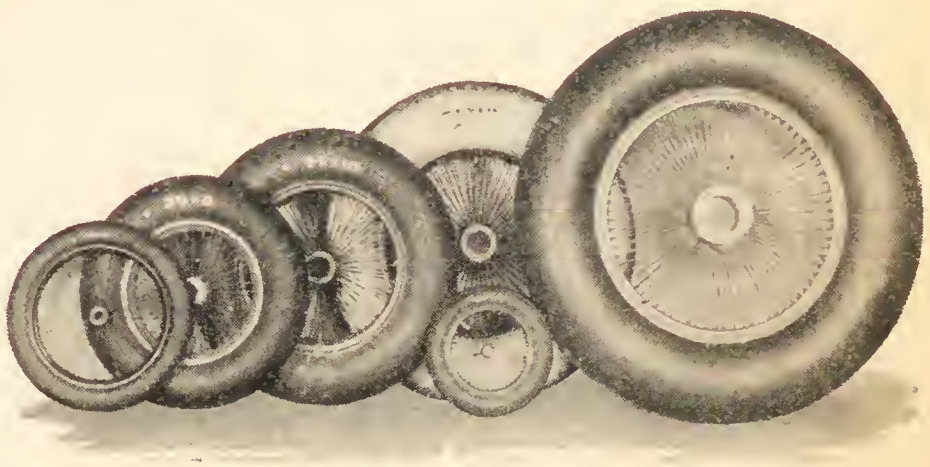
And because of these facts, it is interesting to note that Dayton Wire Wheels (streamlined to cut down wind resistance) were used for the landing equipment of these planes. This selection was the logical result of thousands of tests which have demonstrated the strength and efficiency of Dayton Wire Wheels.

It makss no difference whether it be on planes or automobiles, Dayton Wire Wheels continue to prove their worthiness of the utmost confidence of—

"The Man Who Drives or the Man Who Flies"

THE DAYTON WIRE WHEEL COMPANY

DAYTON, OHIO



Here is a group of Airplane Wheels which we have designed and built for various types of Government planes. This group includes samples of the wheels built for pursuit planes, Martin Bombers, the Barling Bomber, and the new Super Plane now under construction by the Government, aptly illustrating our ability to design and build wheels for any type of plane.

Dayton Wire Wheels

QUICK DETACHABLE

Slipstream

SLIPSTREAM—The stream of air driven aft by the propeller

VOL. 6 APRIL No. 4

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879

SUBSCRIPTION RATES

One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL, Editor and Publisher

CONTENTS

WALNUT *The* REAL WOOD
FOR AIRPLANE PROPELLERS

BUILT ON HONOR
HARTZELL
WALNUT
HARTZELL WALNUT PROPELLER CO.
PIQUA, OHIO, U.S.A.

This Trade Mark is the guarantee of quality. Look for it always on Propellers.

Glueing Propellers Blades

Selecting Laminations for Propellers

View of Our Yards Showing Large Stock of Walnut

Aeronautics and Agriculture

How billions will be saved in forests and crops by unique but highly practical aircraft dusting apparatus.

By ALAN L. MORSE, S. B.

Much has been written recently of Airplane Dusting with public interest centered on the extensive dusting tests to be conducted by eastern aircraft manufacturing concerns in conjunction with the Bureau of Entomology, Department of Agriculture.

In connection with Aerial Dusting we are pleased to publish the following article, "Aeronautics and Agriculture" by Alan L. Morse, an authority in this very important phase of commercial aviation. Mr. Morse graduated from the Massachusetts Institute of Technology in 1921 where he obtained a degree of S. B., in General Engineering. During this course he specialized in Aeronautical Engineering and took the post graduate course in that subject in his fourth year. After six months with the Witteman Aircraft Corporation at Hasbrouck Heights, N. J., he came to McCook Field where he was employed as an aeronautical engineer until quite recently. In the spring of 1923 he was sent to Tallulah, La., to assist the Department of Agriculture in the development of airplane dusting apparatus. The apparatus which was developed there and for which Mr. Morse is greatly responsible is still being used in the more recent tests. Since this time Mr. Morse has turned his study and experimenting to the development of balloon dusting apparatus, the small dirigible having been found peculiarly adaptable to dusting. Lately Mr. Morse made an extensive study of the commercial possibilities of aircraft dusting in general and having satisfied himself with the results of this research has succeeded in listing the services of his brother, Stanley F. Morse of the Morse Agricultural Service, 133 Front Street, New York City, who will added airplane dusting to his other agricultural service. They are equipped with improved apparatus and are already booking contracts for dusting in New England and in the southern cotton districts.

In the accompanying article Mr. Morse explains some of the most important late improvement in aerial dusting methods and equipment.

FIGURE 1

Showing type of Dusting Blimp designed by Matt. Q. Corbett, and equipped with latest type of dusting hopper. This Blimp is known in the Air Service as the OA-1 and was sent east in 1923 to quell a serious outbreak of the dreaded "Gypsy Moth" in New England forest lands.

THE most serious warfare ever waged by man, one in which the very existence of the race depends, is being fought today with every backyard a battlefield and every farm a major front.

It is the struggle between the human race and the insects to determine which will flourish on the earth. The city dweller so far is oblivious to this conflict, which he feels only in the increased cost of food and clothing. The farmer feels it keenly in that crop wastage caused by insects costs him dollars and cents.

Destructive Insects Gaining

But the experts of the United States department of agriculture who are making man's organized efforts to conquer the insect enemies, looking beyond the present cost in money, wasted labor and destroyed crops, regard the future of the struggle as potentially the greatest crisis ever to confront the race.

Despite greatly accelerated resistant measures being taken by the department, destrutive insect pests are constantly gaining. The most the department has been able to do in many cases is to retard the spread of insect blights. Insect depradations among American crops cost hundreds of millions of dollars annually and each year cost more than the last. If the increase in insect destruction continues at its present rate the time will come when what the insect takes will amount to so much there will not be enough left to satisfy man's needs.

The new insect menace appeared within the last generation. Conditions brought into effect by civilization gave the insect its opportunity. Originally, under natural conditions, for every insect there was a natural enemy. Parasites infested them. Birds ate them. Other carnivorious insects lived on the eggs of another species. This natural balance restrained dangerous kinds of insects from becoming too numerous.

Nature's balance was distorted by civilization Man denuded vast stretches of country of its natural forest. Bird life was restricted. With natural conditions destroyed, various

species of insects found a sudden oppotunity to expand.

Intenational commerce spread insects in strange parts of the world where, freed from their natural enemies, they could expand unhampered. Plants brought from Asia to America carry two or three specimens of an insect, which innocuous in its homeland, found in its new envionment a chance to flourish untroubled by its natural enemies. Immediately the strange insect multiplies and becomes a menace.

THE most important industry in the world is farming. It is the basic industry. Our lives depend upon the farmer and his willingness to stick to his job. Hence, anything that will increase his output or lessen his costs is of vital interest to all of us.

The breed of unsophisticated, over-worked "rube" is rapidly being replaced by the modern, well educated, wide awake farmer who manages his farm with the same intelligence and efficiency that the corporation executive manages a manufacturing plant. If he does not, he makes no gropress, for modern farming is a highly specialized, highly competitive business. It is of interest to note that many modern farms are being managed by salaried executives, who must show a profit or lose their jobs. Efficient farm operation means the production of the most crops for the least cost. This can be accomplished only by the prompt adoption of the most up-to-date farming methods. Since the first to adopt these methods will be able to take his profits while his market prices are still maintained on the standard of the older methods.

In general the farmer has been forced to adopt new methods, because of the ever increasing scarcity of farm labor and abundance of insect pests and fungous diseases which pick the busiest part of the season to wreok their detruction. It is a salient fact that the U. S. Dept. of Agriculture spends millions annually on experimental work in attempting to devise better methods for controlling these pests, and that their work is continually being extended by the all-too-frequent appearance of new scourges, which do a tremendous amount of damage before parasites or poisons are discovered which will control them.

In the past, liquid sprays were used to a very large extent, as insecticides and fungicides. They are, however, rapidly giving way to the use of powdered poisons which have proven, in most cases, to be far superior. The use of powder or dust eliminates the hauling of water to acreages located at some distance from any well or spring. Liquid spray must be placed more or less exactly, and will not penetrate very far into the foliage, but powder blow out into the air in atomized form becomes a part of the air and floats and drifts through everything; it covers the foliage completely.

Various devices have been used for distributing this powder, all of which consist, mainly, of a tank or hopper containing the powder, and a rotary blower. The blower sucks in air and powder from the hopper, mixes them, and blows them out through one or more nozzles in a highly atomized cloud which envelopes and covers the foliage. These machines range in size from the hand gun to the platform cart, on which is mounted the power-driven dusting appartus. These are efficient on moderate acreages, but they are about to be replaced by the aircraft duster on large acreages. Aircraft dusting is the cheapest, most satisfactory method so far developed for dusting large acreages.

Most of us have read or heard about the experiments carried on by the U. S. Dept. of Agriculture on airplane dusting in Louisiana under Dr. Goad, and on balloon dusting in New Hampshire under Dr. Burgess which consists mainly in flying the airplane or ballon back and forth over the infested area, while distributing the dust. The results of these

ENORMOUS ANNUAL LOSS TO THE UNITED STATES CAUSED BY INSECTS

The following statement of the annual damage done by insect in this country as compiled by the Bureau of Entomology, Department of Agriculture, is given in the aeeompanying record. According to this body the appropriations for investigations of injurious insects for the next fiscal year amount to something over two million, two hundred thousand dollars.

FARM CROPS:	
Cereals	$ 430,204,600
Hay	116,230,500
Cotton	140,631,100
Tobacco	16,900,800
Vegetables	199,412,600
Sugar Crops	8,436,800
Fruits	141,264,300
Farm-forest products	22,138,900
Other Crops	29,649,700
	$1,104,839,300
NATURAL FORESTS AND FOREST PRODUCTS	100,000,000
PRODUCTS IN STORAGE	100,000,000
INSECT-BORNE DISEASES OF MAN	150,000,000
DIRECT OR INDIRECT DAMAGE TO DOMESTIC ANIMALS	100,000,000
GRAND TOTAL	$1,554,869,300

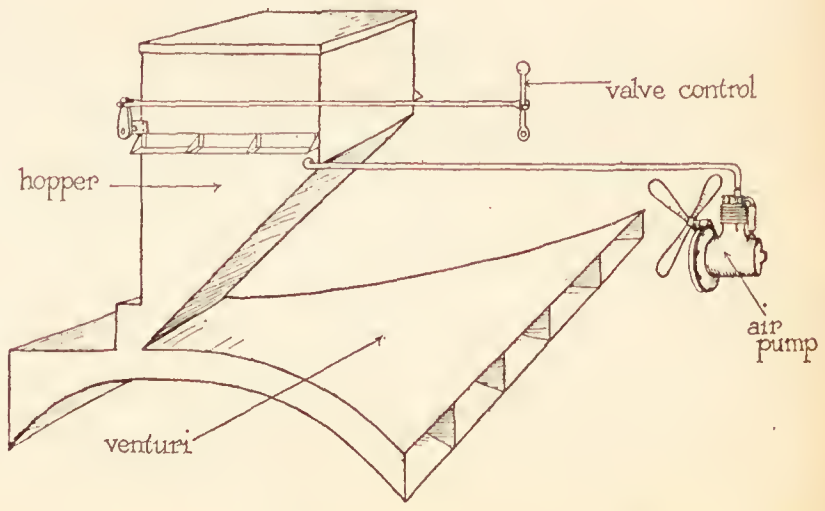


FIGURE 2

The latest type of Dusting Hopper is simple and quickly removable

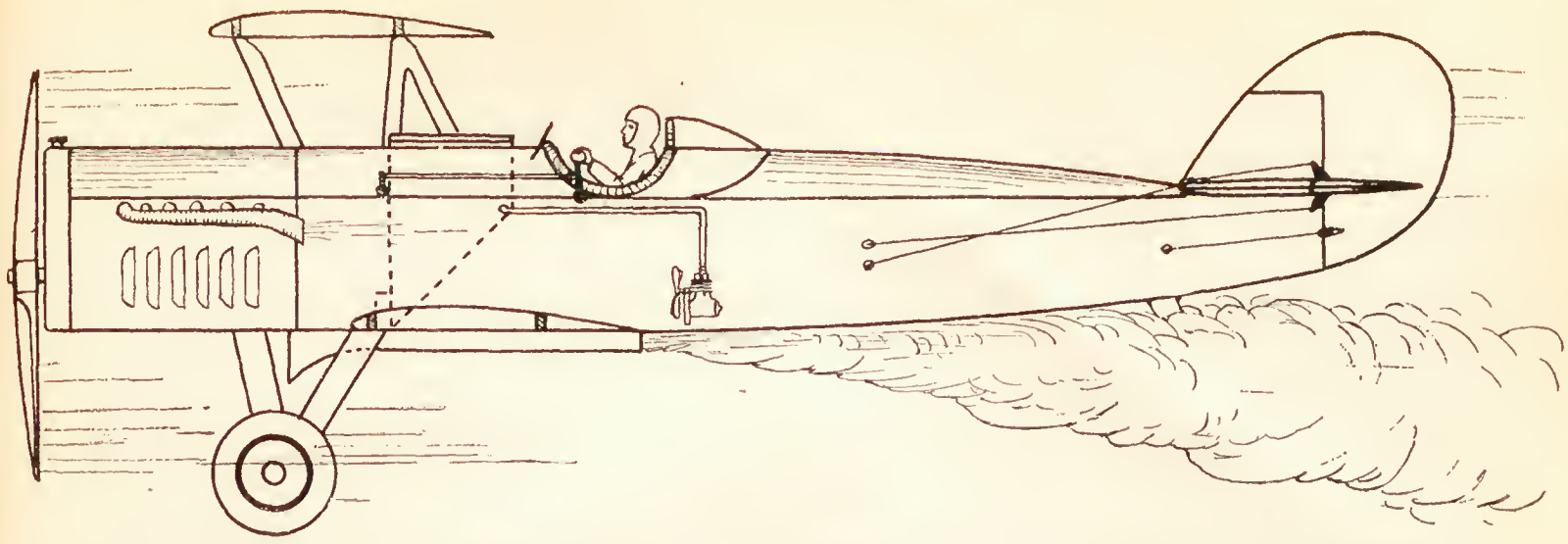
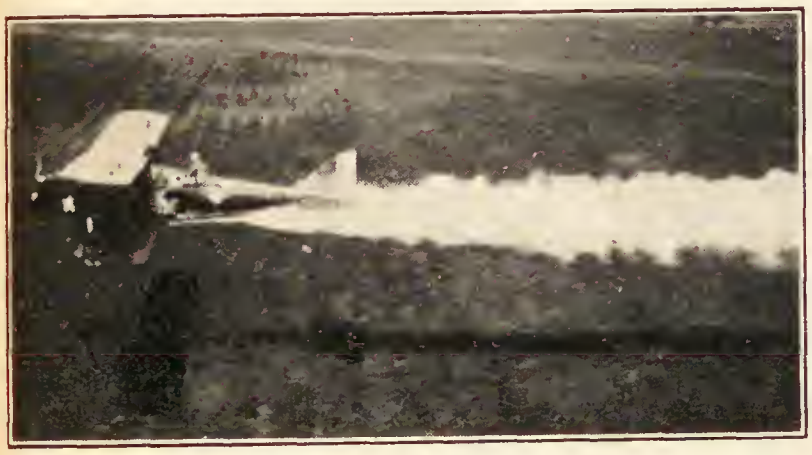


Fig. 3—The pilot of the airplane controls the flow of powder by the lever at his left as shown in the sketch.

experiments have proven, beyond a doubt, the efficiency of airplane dusting, and have indicated that balloon dusting will be equally as efficient as soon as some of the minor difficulties have been ironed out. The fact remains that the dirigible balloon is the only safe and practical type of aircraft to use in dusting rough or thickly wooded country, since engine failure does not mean a forced landing. The difficulties are not serious, however, and we will soon see the dusting balloon operating as efficiently as the airplane. In fact a small, highly mobile balloon has been designed for this

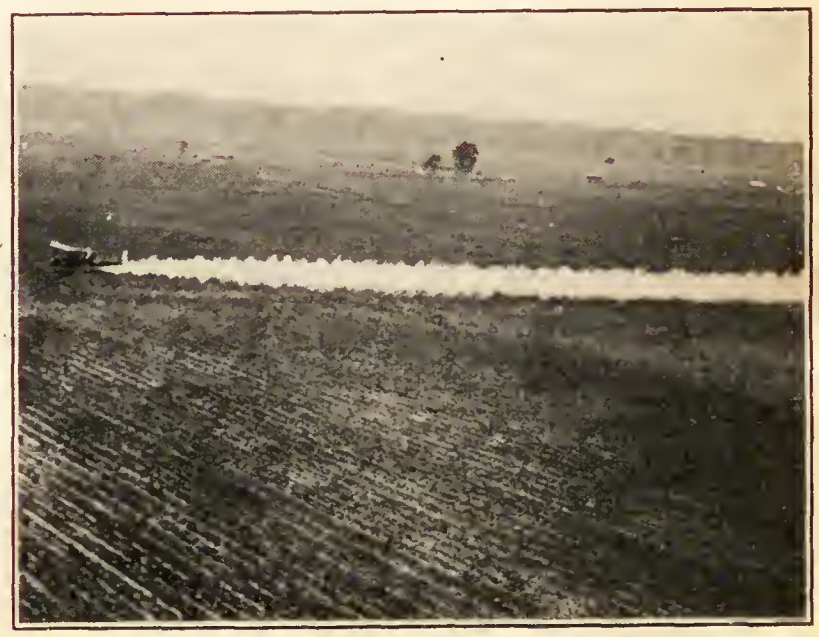


The airplane is flown close to the ground. The accompanying photo shows the plane about fifteen feet above the surface.

very purpose by Mr. Matt Q. Corbett, now with Aircraft Development Corp., and is now being constructed under his supervision. This promises to be a truly practical machine and will fill a real need. It is shown in the accompanying sketch (Fig. 1).

The original experimental work in airplane dusting was first carried on in connection with boll weevil control, but it was found, as the project developed, that hitherto unthought of fields for aeronautics were opened through the use of the dusting aircraft. It may be used for scattering any kind of powdered insecticide or fungicide. Even the fever-carrying mosquito can be controlled by this method, which is more effective and cheaper than the use of oil. It can be used for the broadcast sowing of seeds and the spreading of fertilizer, and, with the dusting appartus removed, it can be used as a passenger or freight carrier, or as photographic aircraft in crop estimation work. Crop estimation work used to be accomplished by traveling about and spotting fields here and there. This was incomplete and very expensive.

AT first thought, we might be inclined to doubt that powder, scattered from an airplane, would ever reach its objective. We would expect to see it blown all over the countryside by the propeller slipstream, and such breezes as happened to be stirring. This, in fact, was the biggest doubt in the minds of those who witnessed the first dusting flight, and great was the astonishment when the dust was driven down into the plants, completely covering them, and stuck to the foliage, in spite of the fact that it was a windy day, and that the plants were dry. This was due to two things: First, there is a "downwash," or down current, in the wake of an airplane which is caused by the passage of the wings through the air. This lays the powder on the ground. Secondly, an airplane in the air is electrically insulated from the ground, and due to its high velocity and air friction, and due to the friction of the dust while being ejected, the particles of dust receive an electrical charge which is of opposite side from the charge carried by the earth. This causes the dust to stick to the



The settling of the poisonous dust is positive even though it is thrown back some distance behind the plane.

plants. Up to this time it had been necessary to dust at night or in early morning when there was little wind and when the plants were wet with dew. The next item of doubt was the penetrability of powder thus distributed. This was investigated in the following manner: A particularly dense portion of a cypress swamp was chosen and some small glass plate were placed on the ground well in under the foliage, which was so thick and deep tht only ten per cent of the sunlight found its way through. After the dusting airplane had made a trip over the tree-tops, these plates were found to be covered with powder. This settled it—airplane dusting had come to stay.

Of course, operating methods had to be perfected, and there were many refinements to be made in the appartus. The feed was not uniform, and some of the powder was coming through in small pellets. This last is a serious defect that exists to some degree in all dusting appartus. Perfect atomization must, at least, be approached, since, in cotton ,it means a saving of one or two pounds of powder per acre per application, and at fifteen or twenty cents a pound, the saving on large acreages is considerable.

And so a great deal of experimental work has been carried on with the result that today we have airplane dusting apparatus that feeds uniformly, and atomizes the powder very well. A late development by the writer in this line is shown in the sketches in figs. 2 and 3, and consists of a tank or hopper in the airplane fuselage, which carries the powder, and a venturi tube with a fish-tail exit under the fuselage. The powder is dropped into this venturi at the throat, where it is caught by the blast from the propeller, which is tearing through the venturi, atomized, and shot out through the narrow exit in a ribbon-like cloud that settles among the plants. The powder is more or less sticky, and will not flow uniformly without some means of agitation. This is accomplished by compressed air which is delivered to the hopper by a wind-mill driven air pump at fifty or sixty pounds per square inch pressure. Inside the sloping bottom of the hopper are small copper tubes with closed ends, which are drilled at intervals with tiny pinholes. The compressed air blowing through these pinholes keeps the powder from sticking and bridging, so that it flows uniformly, and keeps it fluffed up, thus tending to prevent the formation of pellets and assisting atomization greatly. The flow of powder is regulated by a vertically sliding gate valve at the bottom of the front face of the hopper. This is operated through push-pull rods and bell-cranks by a lever at the pilot's cockpit, which he moves with his left hand while flying. The venturi is equipped with air-vanes which insure laminar flow and even distribution of the air and powder across the exit. These can be seen in the sketch.

The farmer has been watching these dusting experiments with eager expectancy, since he realizes that if it were possible for him to avail himself of this latest development, it would reduce his costs, ease his labor situation, and relieve him of the worry that comes from not knowing when his crops will be wiped out, or at least badly damaged, by some insect pest or fungus disease. The people of the malaria regions have been following the work with equal interest, for to them its success means freedom from that racking fever from which one never fully recovers, and from which one never becomes immune.

But—aircraft operation is a highly specialized business, and while the average man can navigate his "tin lizzie" with varying success, he cannot jump into an airplane and fly without a period of flying training, even if he could afford the airplane and its maintenance. It is of general interest, then, to know that aircraft dusting is now commercially available.

TRAVEL AIR, INC, MAKING MANY SALES

According to latest word from Walter H. Beech, Vice President and General Manager of the Travel-Air Manufacturing Company, Inc., of Wichita, Kans., their "New Travel Airplane" is being received well on the market. A letter dated March 28 to the editor of "Slipstream" states that the following sales have been made: Three planes to Phillips & Bowman, Tulsa, Okla.; two planes to Campbell Airplane Company, Moline, Ill.; five planes to O. E. Scott, Field Manager, Lambert Field, near St. Louis.

The Travel Air Manufacturing Company, Inc, has recently secured an eighty acre field at Wichita and construction of hangars on this field has started.

DETROIT PROPOSES AIR TRANSPORT COMPANY

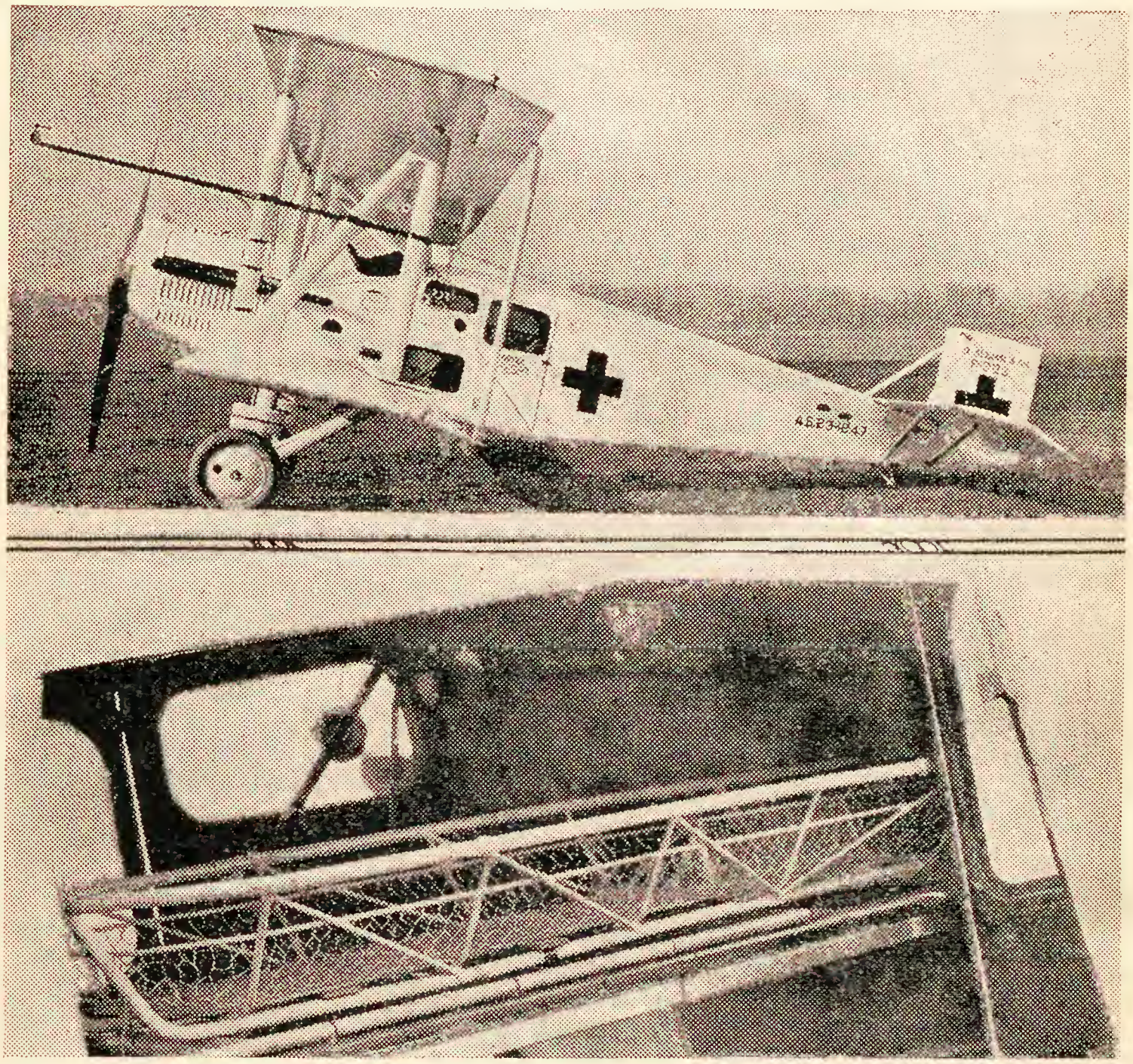
The proposal that a private corporation, capitalized at approximately $2,000,000, be formed to take over the operation of the United States Air Mail between New York and Chicago, which will be a night flying route after July 1, was discussed at a conference at the Ford Airport recently, followed by a luncheon and another conference at the Detroit Club.

Among the speakers were Edsel B. Ford, Howard E. Coffin, William B. Mayo, and E .V. Rickenbacker, of Detroit; Paul Henderson, second assistant postmaster general and executive head of the Air Mail; Robert E. Cowie, vice-president of the American Railway Express Co., C. M. Keyes, president of the Curtiss Airplane Co., Leonard Kennedy, representative of the New York banking firm of Dillon, Read & Co., R. W. Schroeder and Rep. Frank R. Reid of Chicago.

Although Detroit is not on the air mail route, this city was selected for the conference because of the rapid strides toward American leadership in aeronautics it has taken in recent months.

The A-1 Aerial Ambulance

By FRED FLADER
(Engineering Division, A. S. Represeneative)



Top: The A-1 Aerial Ambulance. Bottom: Showing door opening to patients' compartment with litter in place. An additional litter is located directly beneath.

Editor's Note:

The A-1 Ambulance plane was designed by I. M. Laddon, Army Air Service Design Engineer, located at McCook Field, Dayton, Ohio. Mr. Laddon received his early schooling at Rockland, N. Y., and at Montreal, Canada. After completing his high school education he entered upon an engineering course at McGill University and while a student here spent his vacation periods working in the Engineering Department of the Canadian Pacific Railway Company.

His first real job was that of experimental designer at the Cadillac Motor Car Company, Detroit, Michigan. In 1917, during the period the Air Service was making a determined effort to secure the services of engineers experienced in automobile design who could qualify as aeronautical designers, the various motor car concerns were requested to release to the Department of Air Service men who were so qualified. Mr. Laddon was so recommended and joined the Engineering Department at Washington, D. C. Sometime later he was transferred with this Department, to McCook Field, as an Aeronautical Engineer. Two of the planes which he assisted in designing were the U. S. A. C-1 and C-2 and also the Armored Ground Attack plane G. A. X.

In the spring of 1918 he was chosen to assist Captain LePere who was engineer in charge of the French Mission at Detroit. While with this Mission he assisted in the design of the LePere Byplane, Lepere Triplane and other types. In 1919 he returned to McCook Field and was appointed supervisor of Design Group No. 2 which was then composed of the best designers in the Army Air Service. His latest design, the A-1 Ambulance is the result of several year's experimenting and preliminary design work and is in accord with specifications set down by the Army Air Service and Medical Department.

AMERICA has her first airplane especially designed and constructed for ambulance purposes. This airplane, known officially as the A-1 has been built and delivered to the Engineering Division, Air Service at McCook Field, by the Cox-Klemin Aircraft Corporation of Baldwin, L. I., New York. This company is under contract to furnish two of these ships to the government. The A-1 has been flown at McCook Field and is found to have those flying and performance characteristics desirable for

this type of aircraft. The ship climbs rapidly after a short run on the ground and lands at a surprisingly low speed. Its controlability in the air and on the ground are very satisfactory.

The United States Army Air Service is generally accredited with the first attempt in the use of an airplane for the transportation of sick or wounded. Shortly after the World War a service type airplane was converted into an aerial ambulance. This initial experiment served mainly to show the special requirements for ambulance aircraft, and also the impracticability of using machines converted from other airplanes. Using an airplane not designed for the purpose, difficulties are encountered in providing proper housing in the fusilage for the patients with their litters, and the necessary attendants and equipment. A very necessary consideration, ease of loading and unloading , is not obtainable. The performance characteristics of the usual military airplane are unsuitable for ambulance work.

An interesting ambulance airplane was later obtained by converting a sister ship of the famous T-2 transport of transcontinental fame. Sufficient room was available in the passenger cabin to place two litters for patients together with seats for medical officer and a nurse. Accommodations were made for medical supplies. running water and other conveniences.

Early in 1923 specifications were drawn up by the Engineering Divison for an airplane to be constructed especially for ambulance purposes. This airplane was to be designed primarily for crash rescue work, with characteristics such as to make it suitable for landing in isolated and restricted places, near where airplane crashes might occur. This requirement made necessary, the specifications of a low landing speed, and a high rate of climb, for getting in and out of small fields. A high speed in excess of one hundred miles per hour was not required. A divided axle landing gear without the continuous horizontal axle was also specified to enable the airplane to taxi through weeds or hay.

Several preliminary designs were made at McCook Field with these requirements in mind. The most promising of these was selected, and the detail design completed. In June, 1924, a contract was awarded to the Cox-Klemin Aircraft Corporation to construct two of these ships, the first of which was completed early in the present year.

Accommodations are provided normally for two stretcher cases, or by removing the litter supporting members, four sitting cases can be carried. A seat is provided for a medical officer in the ambulance compartment. The pilot's cockpit is forward and separate from the patient's quarters. A cabinet is built into the structure containing medical supplies and first aid equipment. In addition several thermos bottles, water for medicinal purposes and splints for fractured arms and legs are carried. Provision is also made for wrecking tools to be used where bad crashes make the removal of injured men difficult. Fuel for three hours' flying at full throttle is carried in two tanks located in the lower wing stubs on either side of the fusilage. An engine-driven fuel pump and a hand-operated wobble type pump, are incorporated in the fuel system.

THE dimensions of the ambulance compartment are: Length 80 inches, width 48 inches and height 65 inches. The two patients are located one above the other on one side of the airplane, while the medical officer sits beside them. The doctor is in such a position as to have ready access to any part of the patients' bodies, and to the medical cabinet and other supplies directly in front of him. The medical officer will ordinarily be in command. A clock and altimeter are mounted before him, and he has access to a speaking tube connecting with the pilot's helmet. The average man can stand nearly erect in the cabin. Loading of the stretcher cases is accomplished through a large opening in the fusilage, closed in flight by a double-hinged door. A specially designed truss structure in this bay permits the absence of diagonal members which would interfere with the loading . The litters are the type now being standardized in the Army and Navy for all transportation of wounded. These litters are light and strongly made of steel tubing and covered with wire meshing. The wounded are strapped into the litters which are provided with clamp fasteners where they are held to the supports.

The pilot's cockpit is located on the left side of the airplane, forward of the main cabin and high in the fusilage. This affords excellent vision for flying and landing the airplane.

The fuselage is made up of seamless steel tubing with welded joints. This construction is very substantial and rugged and will minimize the danger of injury to the occupants of the ship in the event of a crash. The wings are of wood construction. Spars are of the box type with spruce flanges and two-ply spruce webs. All spars are rectangular and of the same dimensions for the four wing panels. The main wing ribs are a simple truss type with very few members. Their load capacity is 50 pounds per ounce under test. Compression ribs are made up of a plywood with balsa wood core and mahogany face plys, cut to the wing contom and lightened out to form a truss. The actual compression loads are carried through spruce strips fastened to the balsa plywood rib. Balsa plywood is used to advantage in a great many cases throughout the airplane. All tail surface ribs are of this construction. It is particularly good for flooring. The ambulance compartment floor is very large, and has to support a man's weight on any part of it. The walking boards covering the gasoline tanks in the wing stubs are made of three-eights inch balsa plywood. The use of this kind of flooring

has resulted in a considerable saving of weight.

Duralumin is used throughout the control system. The use of this material has produced very light and satisfactory controls. The tail plane spar and all interplane and tail bracing is of duralumin tubing. Balsa plywood is used in the tail surface rib construction. No fin is used because of the large fin area afforded by the side of the fuselage aft of the center of gravity. The rudder is braced by means of struts to the stabilizer which in turn is braced to the fuselage. A bearing is provided at the end of the rudder braces to premit the rotation of the rudder.

The landing chassis is simple and rugged. Three members on either side of the ships serve to take the landing loads. One of these, connecting the axle with the wing stub carries the shock absorber houses in a streamline fairing. The shock absorbers on the chassis and tail skid have long strokes, and are designed to secure very easy taxing . The chassis is adapted to the use of oleo shock absorbing members.

Design Characteristics

Power Plant

Engine	Liberty 12—400 H.P.
Fuel	108 Gallons
Oil	10.8 Gallons
Water	16 Gallons

Dimensions

Span both wings	44 ft., 9 inches
Chord	6 feet
Incidence	0 degrees
Diherdral	1½ degrees
Aspect ratio	7.46
Gap	6 ft., 7 1-9 ins.
Distance from C. G. to rudderpost	20.36 ft.
Distance from C. G. to elevator hinge	20.76 ft.

Areas

Upper wing	266.75 sq. ft.
Lower wing	243.25 sq. ft.
Total wing area	510.00 sq. ft.
Stabilizer	30.5 sq. ft.
Elevator	22.76 sq. ft.
Rudder	10.44 sq. ft.

Weights

Weight empty with water	2980 lbs.
Crew and passengers	720 lbs.
Fuel and oil	729 lbs.
Equipment	351 lbs.
Disposable load	1800 lbs.
Gross weight with full load	4780 lbs.

Performance

Landing speed	40 m. p. h.
High speed at ground	118 m. p. h.
Rate of climb at ground	930 ft. min.
Service ceiling	17,000 ft.
Absolute ceiling	18,300 ft.

THE aerial ambulance promises to be a very useful type for civil and military purposes. Its principle applications during peace time will be in crash rescue work, and for the conveyance of sick and wounded to hospital centers. In Panama, the Philippines and in Alaska, there are great possibilities for the airplane ambulance. Persons afflicted with fever or other diseases peculiar to those possessions can be carried from isolated places to cities where hospital facilities are available. Because of the increased speed and comfort of this means of transportationfi many lives can be saved.

Important use is being made of aerial ambulances by the French and British. In France a zoning system is being established, with airplane ambulances situated at strategic points throughout the country. These ships are operated by the government for civilian use in cases of emergency where aid is required.

A large number of patients have already been conveyed and treated. These airplanes are also in use by the French in Algeria and Morroco.

A British seaplane is in continuous use in British Guiana for transporting fever cases from upland regions a distance of 200 miles to the hospitals. The trip is made in two hours which formerly required 17 days of hazardous and uncomfortable traveling. Many lives have been saved in this way.

The extremely mobile characteristics of the airplane. both as to speed and adaptability to go to isolated places make the aerial ambulance an important factor in commercial and military aviation. The comfort and smoothness of flying, for sick or wounded, is also a big consideration in favor of the ambulance airplane.

PHOTO MEN FORCED DOWN IN EVERGLADES

R. L. Smith and E. P. Lott, aerial photographers affiliated with the Fairchild Aerial Surveys of New York, were lost for four days in the Florida Everglades but were rescued March 31 from a hummock in the swamps near Hall City, where they were forced to make a landing due to leaking cylinders in their motor. Unfamiliar with methods of travel in the swampy country the two flyers could not find their way to firm ground and remained with the disabled ship. Straining swamp water through a handkerchief and boiling it in a small can they managed to survive with no serious hardships. An intensive search was made for the lost flyers with other planes which traversed hundreds of miles over the Everglade region in search for them. The marooned airmen were discovered by one of these searching parties which landed within a short distance from them and escorted them to the town of Sebring.

OFFICER FOR McCOOK CONSTRUCTION NAMED

Colonel Edward S. Walton, Q. M. C., was assigned on April 1 to duty as construction quartermaster in charge of the construction work at the new site of the Engineering Division, Army Air Service, near Dayton.

Colonel Walton has been on duty in the office of the assistant Secretary of war, office of the Quartermaster General and as instructor in the 29th Division National Guard, Washington, D. C. He will be relieved from this work and stationed at Dayton, during the two or more years required to complete the new air station. An initial appropriation of $500,000 was made available for the preliminary work at the new site, and it is expected that an additional sum will be appropriated at the next session of Congress.

Congressman Daniel Anthony (Kansas), chairman of the army appropriation bill, will visit Dayton to view the preliminary work on the new air post.

An Air Line With A Promise

THE STOUT METAL AIR PULLMAN IN FLIGHT

This ship has 400 cubic feet of interior space, fitted as a passenger cabin. It is ultra luxurious with its unholstered lounge chairs that can be folded out for night comforts. The cabin is well heated, has modern accommodations. A well muffled exhaust makes it possible for passengers to converse with ease. The pilot is well forward in a separate but well sheltered cockpit, the visibility of which is exceptionally good. Power used is the Liberty 400 h. p. motor, although the Ford interests are expecting to soon have available a lighter and cheaper engine. The ordinary cruising speed is 100 miles per hour, although it has a capacity speed of well over 145 miles per hour.

A REPRESENTATIVE of Slipstream had the pleasure a few days ago of talking with William B. Stout, more commonly known in air circles as "Bill" Stout, and builder of the famous all-metal "Air Pullman," which caused such a foray of comment and enthusiasm at the International Air Races at Wilbur Wright Field last October.

There has been such publicity given lately to the connection Henry and Edsel Ford have acquired with aviation. The Fords recently turned a plot of ground near their factory at Dearborn into a municipal airdome and built a small but faultlessly equipped factory hard by, which flaunts a gilt sign reading "Stout Metal Airplane Company." As a result of this, the newspapers were soon broadcasting the sensational news that Ford had gone into the "aerial flivver" business. Consequently, the public continues to be "over-sold" on aeronautical progress and refuses to appreciate, or take serious note of the more conservative but practical developments.

During his visit to Dayton Mr. Stout was accompanied by a Mr. Hicks, prominent engineer from the Ford factory. William B. Mayo, chief engineer of the Ford Motor Car Company is likewise very active in his interest toward the Stout Metal Air Pullman and also toward the Duralumin Dirigible project instituted by Ralph Upson, as the chief undertaking of the Aircraft Development Corporation, which firm is also under the wing of vast financial proponents, including the Fords. A huge mooring mast will soon be erected at the Ford airdome to accommodate lighter-than-air craft, the first it is hoped being the duralumin 80,000 cubic inch blimp now under construction at the shops of the Aircraft Development Corporation.

The first of the Stout Metal Air Pullmans, the "Maiden Detroit," was constructed for experimental purposes. It made several inter-city trips, carrying passengers. The original ship has been greatly improved and the second ship, the "Maiden Dearborn," just completed, looks as pretentious and inviting as a luxurious motor car and indeed, every bit as substantial although it does not weigh as much as one of these kindred vehicles of terra firma habits.

We are glad to learn from Bill Stout, himself, just what the organization expects to do and to relate the facts without fantastic flourish or visual prophecies of what these plans may usher in or realize.

The "Maiden Dearborn" has within the last few days been placed on an intermittent schedule between Detroit and Chicago. A half ton of Ford products will be carried upon each trip and a careful check kept on the vital factors that would tend to prove the practical advantages in air transportation of merchandise. Passenger carrying will afterwards be checked up and these figures offered both to induce buyers of the ships and to assist these buyers in operating their ships on an actual paying basis.

Mr. Stout expressed the view that outside capital could now be secured without trouble and that there were numerous individuals and organizations who were in the market for Air

Pullmans, but that for the future interests of the Stout organization, it was deemed best to carry on the first experimental air lines under the jurisdiction and guidance of the company.

The third Metal Air Pullman will be finished at the Stout factory about the middle of April. This ship will be placed upon another experimental inter-city service route, after which it is planned by the Stout firm to go into production of ten ships. These will be available either to individuals or organizations, which expect to operate independently or in conjunction with the Stout firm.

Although, as stated, ships are not now available, inquiries are solicited by the Stout organization, either from reliable individuals, groups or corporations, who are seriously considering the operation of air lines.

The first ship will be sold for $25,000, although quantity production will likely reduce this cost fully one-half.

This firm has recently moved its offices from the General Motors Building, Detroit, and should now be addressed Stout Metal Airplane Company, Dearborn, Michigan.

ENGLAND ORDERS AMERICAN SPRUCE

Since the world war there has not been any additional heavy inroads upon our Northwestern spruce forests. So much of the timber was used and destroyed during the war period that there was much talk of a rapid exhaustion of the supply.

A recent report comes from Vancouver, British Columbia, that Vickers, Ltd., a well-known English Aircraft plant, has placed a huge order for 2,000,000 feet of the spruce timber with a Vancouver lumber dealer, for delivery in 1925.

This is an indirect indication of the extensive airplane building planned by the British Air Ministry, for the near future.

I. C. C. TO CONSIDER WORLD AIRWAYS

At the meetng of the International Chamber of Commerce in June at Brussels, ways and means to promote international airways systems will be discussed.

AVIATOR "A WASH-OUT" AS KITE FLYER

Lieutenant C. E. Thomas, Jr., stationed at Wilbur Wright Field, Dayton, Ohio, bears not a single scar from many hours at looping, barrel-rolling, tail-spinning and doing the "falling leaf" with an airplane.

But this record stands for naught, and with the foolhardiness of the fabled Icarus our ambitious lieutenant intoxicated by the unseasonable balmy south winds of a recent March afternoon, hied himself to the open commons to show his young son the Benjamin Franklin system of flying a kite.

Disregarding the standing orders of the Chief of Air Service to make no flights without parachute equipment, our valorous lieutenant tripped the light fantastic across the velvety green of the commons with the kite gaining altitude like a Curtiss PW8. With beaming countenance cast upon the careening form of the kite, Lieutenant Thomas heeded not his fast approach to an open storm sewer, nor halted his headlong course until he landed head first at the bottom of the 12-foot basin.

Moral: Since professional baseball magnates have forbidden players from riding in airplanes, it might be well for Air Service authorities to forbid aviators from flying kites.

JAPAN'S NAVAL AIR PROGRAM

While nothing definite can be ascertained about Naval Aviation Programs in Japan, the following reports from the Teikoku (Imperial) News Agency, as furnished by the Intelligence Department, may be of interest:

"The following program for aerial expansion will be presented in the 1924-1925 session of the Diet at the instance of the Navy Department:

1925	One Squadron
1926	Two squadrons
1927	Two Squadrons
1928	One Squadron

"Total by April 1, 1929—Seventeen Squadrons.

"It is probable that completion of the program will be speeded up by legislative action when the Diet again considers Naval Aviation in the 1925-1926 session. It seems likely that 10 additional squadrons will be authorized at a later session of the Diet."

GOVERNMENT WILL NOT COMPETE WITH COMMERCIAL PICTURE MEN

Up until the present time commercial photographers in the business of transporting and making aerial views of news features have run into serious competition at the hands of Government Service planes and photographers. More recently an example of this unintentional competition on the part of Air Service flyers was brought out by Captain "Casey" Jones of the Curtiss Exhibition Company, in connection with photo assignments on the Inaugural Day Exercises.

Learning that a number of Air Service camera men were to be on the job to take "official" aerial films of the ceremonies, Captain Jones, with his usual progressive interest in behalf of commercial development, dispatched a communication to the Chief of Army Air Service, protesting against the unfair custom. Captain Jones stated that the presence of Air Service men would mean that the several commercial companies would likely either pass up the assignment entirely or suffer a loss by having the "official" films thrown on the market.

Replying to Captain Jones' letter, General Patrick stated that he was convinced that the Commercial development in this line of work has now warranted preference being given such concerns. General Patrick pointed out that it was the judgment of Admiral Moffett, Colonel Henderson and himself that the commercial industry should now handle this kind of business in a competent manner, and that service planes and photo equipment would not be used again except in the interests of the Service exclusively.

That the commercial photographers handled the Inaugural job in good shape is shown by the accompanying letter received by Captain Jones from Mr. Cohen, Editor of Pathe News and re-printed in a recent issue of the Army Air Service "News Letter."

My dear Mr. Jones:

Congratulations on the splendid work of your company as well as of your own good self in transporting our Inauguration films. Not only can I say this from the general knowledge of results achieved, but also from personal experience in the front cockpit of that little racer of yours.

Transporting those films from Washington to New York in the record-breaking time of one hour and 28 minutes is a record worth being proud of. It is a great step towards making more feasible the development of commercial aviation and I am quite confident that such achievements as these will encourage the wider use of airplanes for quick transportation.

I noted especially and with much pleasure the careful preparations that you made to insure speed and safety on all of the planes that we used. It is this thorough service that bespeaks efficient organization and assures success."

The Light Plane

By IVAN H. DRIGGS

Designer of the DJ-1, Winner of First American Light Plane Competition

THE previous installment of this series have developed the theory of aerodynamics. This material was academic in character rather than directly applicable to the layout of a light airplane. This section takes up the design of a plane with reference to its physical dimensions, component weights and disposition of surfaces.

The first step in the layout of an airplane is to decide upon the type to be built. The purpose for which the design is intended will largely determine this type. The builders will be given race conditions to meet or his own ideas will dictate the uses to which his design may be put. He also must decide whether he will build a monoplane or biplane. This question may not be dismissed as one of individual preference.

In nearly every case, structural considerations will point to the monoplane for single seaters. The span and wing area will be determined by the performance desired. If a biplane be under consideration it will be found that the wing chord will be so short that the internal bracing in the plane of the wing will be very weak and the wing cell will lack torsional rigidity. To illustrate this point: The desired performance may demand a span of 30 feet for a monoplane or 28 feet for a biplane, the wing area in both cases to be 90 square feet. The chord of the monoplane wing works out to be 36 inches while that of the biplane will be 19¼ inches. This small chord wing could not be properly braced without the addition of a great amount of weight and parasite resistance. If, however, the wing chord of the biplane be increased to a more practical length the area will be increased with a consequent loss of comfort in bumpy air. This analysis shows that for such a design the monoplane will give the best results. Present light plane practice bears out this idea. The greatest number of successful light planes of the single-seater class have been monoplanes. The two-seater has not been sufficiently developed to warrant any conclusions being drawn at this time. Further experience may show that the

Showing a three-quarter rear view of the Johnson "Canary" OX5, three-seater commercial ship, designed by Ivan H. Driggs, Chief Engineer of the Johnson Airplane & Supply Company, Dayton, O. This first ship was recently purchased by Morris Titterington, of the Pioneer Instrument Company, Brooklyn

TABLE II.

Name	Type	No. Cyl.	Power	R.P.M.	Wt.Dry	Displacement Cu. In.
Anzani	Air Cool	3	25	1500	110	122.0
Anzani	Air Cool	3	35	1600	128	190.0
Wright	Air Cool	3	63	1800	175	223.0
			12	2000		
Morehouse	Air Cool	2	20	3000	50	42.5
Morehouse	Air Cool	2	30	2500	85	80.0
Henderson	Air Cool	4	23	2750	127.5	79.4
			22	2500	81 Direct	
Bristol	Air Cool	2	34	4000	105 Gr.	67.0
Harley	Air Cool	2	9	3800	72	37.5
Sargant	Water	4	16	3200	99	46.4
Haacke	Air Cool	2	30	1500	143.5	193.0
Haacke	Air Cool	3	48	1400	132	217.0
Siemens	Air Cool	5	55	1500	225	287.0
Siemens	Air Cool	7	75	1500	278	402.0

monoplane has less advantage over the biplane for this type than in the case of the single-seater.

The next question that must be decided is one of construction and materials to be employed. Here the personal ability of the builder and the availability of materials will have weight. Welded steel tubing for fuselage, tail surfaces and landing gear is very cheap, strong and light. This construction should not be attempted without the aid of a welder experienced in this class of work. It is much safer for the amateur builder to use older methods of construction with which any good cabinet maker is familiar. Spruce, plywood and aircraft wire with turnbuckles will make a satisfactory structure. It is always safe to follow the practice that is in use on large airplanes.

The type of wing bracing to be employed is dependent upon the preferences of the designer. Light airplane wings may be internally braced with but small increases in weight. This type requires slightly more labor in rib and span construction due to tapering than an externally braced wing, however, fittings and wires or struts are eliminated. Internal bracing gives a much cleaner plane and reduces the parasite resistance considerably. Care should be exercised in providing torsional rigidity in this type. This may be obtained by covering the wing between spars with very thin plywood for a large portion of the span.

The next step is to choose the motor. **Table II.** has been prepared from all data at hand on engines suitable for light one-or two-seaters. Nothing need be said regarding a method of choosing an engine. It is obvious that a designer will endeavor to use a motor that calls for the least expenditure, both of money and of weight, for the power he desires to use.

AFTER the power plant has been determined the builder must estimate the total weight of his airplane. **Table I.** of the first section has been repeated here with additional data as**Table III.** This material will serve as a guide in making an approximate weight estimate. Such a figure will be close enough for preliminary purposes. One will see at once that a single-seater will weigh from 450 to 500 pounds and a two-seater from 750 to 800 pounds. There will be some variation from these figures with different engines and types of construction but estimates based upon**Table III.** are sufficiently close for the present. If the detail weight estimate to be made later shows too great a variation from this first estimate the work may have to be repeated and the design of the plane revised.

The designer is now in a position to make a sketch of his plane. The power he intends using and the estimated weight give the power loading, pounds per horsepower. **Figure II.** of the February issue of "The Slipstream" shows the length of run to take off for the above

TABLE III.

AIRPLANE	Wt.	Lbs./ H.P.	Aw Sq. ft.	Lbs./ Sq. ft.	Span Ft.	Lbs/ft.	Lh	Lh/e	As Sq ft.	Ae Sq ft.	Ar Sq. ft.	Af Sq.ft.	Aa Sq ft.	REMARKS
Avro 558	480	26.7	166.0	2.89	30.0	14.6	13.5	4.66	9.5	11.0	8.5		31.7	Biplane
Avro 560	471	23.5	138.0	3.41	36.0	13.1	16.0	3.7	9.0	11.0	8.0		19.0	Monoplane
A. N. E. C.	465	23.2	145.0	3.21	32.0	14.5	10.5	2.33						Monoplane
Wren	408		150.0	2.72	37.0	11.0	15.0	3.75						Monoplane
D. H. 53	490		120.0	4.08	30.1	16.3	13.5	3.00	9.0	13.0	7.5	2.25	30.0	Monoplane
Viget	575	26.0	200.0	2.88	25.0	21.0	11.0	2.6	11.5	8.77	4.84	3.40		Biplane
D-J-1	510	22.7	70.0	7.3	27.0	18.9	12.0	4.37	3.9	3.3	2.4	2.0	7.0	Monoplane
Farman	518	20.75	107.6	4.82	23.0	22.5	10.5	2.33						Monoplane
Pander H-2	650	26.0	110.0	5.9	25.2	25.8	11.0	2.2						Monoplane
Kolibri-U7	364		134.5	4.3	33.0	11.0	12.0	2.92						Monoplane
Roter-Vogel	397		146.5	4.5	33.0	12.0	10.0	2.25						Monoplane
Brownie I	870*	29.0	178.0	4.3	36.5	23.9	15.0	2.27	16.4	15.1	6.7	13.5	26.0	Monoplane
Pander H-1	705	24.2	150.7	6.2	25.3	25.6								Biplane
Wee Bee	837	25.6	187.0	4.47	38.0	22.0	14.0	2.80	6.5	13.5	7.0	4.3	21.5	Monoplane
Daimler L15			258.0		41.3									Monoplane
A. N. E. C.	730	24.3	185.0	3.94	38.0	19.2	13.5	2.7	6.25	12.75	6.00		25.0	Monoplane
Avis	810	28.6	255.0	3.2	30.0	24.7	16.0	3.55	15.2	13.5	9.00		75.0	Biplane
Vagabond	887	27.1	235.0	4.78	28.0	28.9	13.5	3.68	14.0	8.3	5.5	2.5	47.0	Biplane
Blue Bird	875	26.7	243.0	3.6	2.8	28.5	14.0	3.0	17.6	15.6	9.00	4.1	41.6	Biplane
Cygnet	730	23.7	165.0	4.4	28.0	23.8	12.0	2.82	10.0	9.00	7.00		48.2	Biplane
Caspar C-17	716	23.8	168.0	4.25	39.4	18.2								Monoplane
Udet	904	25.8	94.7	9.5	29.2	31.								Monoplane

NOTE: In the case of all biplanes the span loading has been reduced by 1/1.095 to give direct comparison with the monoplanes.

power loading at various values of the minimum speed, and thus determines the required wing area with any airfoil. **Formula (7)** of the January issue gives the wing area required to obtain any minimum speed. This equation is repeated here for convenience.

$$AW = \frac{W\,t}{Kymax}\,{}^{z}_{(v\ min.)}$$

The table of airfoils given in the same section will indicate a good section to use. For cantilever wings the U. S. A. 35 and U. S. A. 45 give good results. For thin braced wings U. S. A. 16 and R. A. F. 15 are satisfactory while U. S. A. 27, U. S. A. 35-B, Gott 430 and Clark V make good thick braced wings.

An estimate of span loading and consequently span may be made by referring to **Figures IV, V** and **VII** of the previous section and also to **Table III.** Seven single-seaters show an average span loading of 18.6 pounds per foot. The average for eleven two-seaters is 25 pounds per foot. The power loadings for the single-seaters average 24 and for the two-seaters 26 pounds per horsepower. In deciding upon the span to use it is wise to hold rather close to these figures. If the power loading is much lower than the above averages the span loading should be reduced in the same proportion.

With the span and area of the wing given it is a simple matter to find the chord. In the case of a biplane the span determined above should be reduced in dividing by 1.095. This takes care of the interference experienced between the wings. The biplane will have a slightly smaller span for the same induced power (see equation 5-a). The tail length required follows after the determination of the wing chord. **Table III** gives the ratio of tail length to average wing chord for the series of light planes. By tail length is meant the distance from the center of gravity of the airplane to the rudder post. In general this length should be from three to four times the average wing chord.

The area of all control and stabilizing surfaces are given by the following formulas:

Let As = Area of horizontal stabilizer in sq. ft.
Ae = Area of elevators in sq. ft.
Cw = Chord of wing in feet
Lh = Tail length in feet
Af = Area of Fin in square feet
Ar = Area of Rudder in square feet
Sw = Span of wing in feet

$$(9)\qquad As = \frac{.27\ Cw\ Aw}{L\,h}$$

$$(10)\qquad Ae = \frac{.25\ Cw\ Aw}{L\,h}$$

$$(11)\qquad Af = \frac{.005\ Sw\ Aw}{L\,h}$$

$$(12)\qquad Ar = \frac{.015\ Sw\ Aw}{L\,h}$$

The area of the ailerons should be from 15 to 18 per cent of the total wing area except when the ailerons are used as flaps for reducing the landing speed.

After all areas and dimensions are calculated and the sketch is complete and satisfactory as to appearance and arrangement a detail weight estimate must be made up and the balance checked. Such a weight estimate is best made to a standard form which includes all items. A convenient form is given below:

POWER PLANT—This group includes all items of weight incident to the motor and fuel installation and is made up by:

A. **The Motor**—(See Table II).
B. **The Propeller**—Mr. H. C. Watts gives a formula for weight of wood propellers:

W prop = .04D3
D = Diameter of propeller in feet

If a spinner is used its weight may be calculated from the size to be used.

C. **Radiators**—Probably will not be present on light planes.
D. **Radiator Pipes and Expansion Tank**—(See C).
E. **Radiator and Tank Water**—(See C).
F. **Engine Water**—(See C).
G. **Gasoline Tank**—The tank weight will depend upon the capacity to be carried. The sketch will give the dimensions from which the weight may be calculated using data from **Table IV.** About one pound should be added for filler and brackets.
H. **Gasoline Piping**—The length may be measured from the sketch and weight calculated. Add about one pound for fittings and cock.
I. **Oil Tank**—(See G).
J. **Oil Pipes**—(See H).
K. **Motor Controls**—A very light control to the carbureter and magneto may be built for one- and one-half pounds by using wires to actuate the levers.
L. **Exhaust Manifolds**—A simple calculation will give the weight after measuring the length from the sketch. Short stacks may be made for one-quarter pound per cylinder.

The sum of all the above items gives the weight of the power plant.

II. FURNISHINGS—This group is made up of:

A. **Flooring**—One-quarter 3-ply suitable for flooring weights, 6-pound per squar foot. The dimensions necessary may be found from the preliminary drawing.

A close-up view of the "Canary," showing the easy access to the passenger compartment to the front of the pilot's cockpit. This is a special feature of this very promising ship.

B. **Firewall**—with the area known it is easy to calculate the weight using data from **Table IV.** on the material to be used.

C. **Surface Controls**—The rudder bar or pedals and the stick unit make up the surface controls. An allowance of three or four pounds is sufficient.

D. **—Instrument Board**—Allow about one-half pound.

E. **—Control Wires**—May be calculated directly by referring to **Table IV** and the drawing.

F. **Seats**—A small seat may be made for two and one-half to three pounds if a standard seat is not to be used.

G. **Cushions**—Allow two and one-half to three pounds.

H. **Miscellaneous**—Items of furnishings not listed should be estimated and inserted here. A small safety belt will weigh about one and one-half pounds. Map cases, tools and tool boxes should all be estimated and allowances made if they are present.

The sum of the above items gives the total weight of the furnishings group.

III. EQUIPMENT—

A. **Instruments**—Weights of some instruments are as follows:

	Pound.
Switch	.5
Oil pressure guage	.4
Altimeter	1.0
Airspeed indicator	.75
Pitot tube	.5
Watch	.6
Compass	2.7
Tachometer	1.6
Shaft, per foot	.2
Airspeed aluminum tube	.03

B. **Parachute**—A seat type parachute, weighs 18 pounds.

C. **Electrical Equipment**—If present the weight should be estimated and entered here.

The sum of the items A, B and C gives the total equipment.

IV. CREW—Allow 150 pounds per man, or use a known individual weight.

V. FUEL AND OIL—Gasoline weighs six pounds per gallon and oil 7.5 pounds per gallon. The oil capacity should be 10 per cent of the gasoline capacity by volume.

VI. BODY GROUP—The weight of the body is the most difficult to estimate when no detailed data is available on similar types.

A. **FUSELAGE**—The only data available on a single-seater is that of the DJ-1, where the complete fuselage weighs approximately twice as much. The following formula gives weights that are not difficult to meet.

Let Wf = Weight of fuselage covered in lbs.
Wp = Weight of powerplant (see I)
Wv = Weight of useful load—III plus IV, plus V.
Wf = 10 (Wp plus Wv)

B. **Cowling**—Here again the preliminary sketch will help in making a reasonable estimate. An allowance of a pound or so should be made for bolts, clips, etc. A small wind shield will weigh one and one-half pounds.

C. **Afterdeck**—Allow about four or five pounds or calculate the weight, knowing the dimensions and materials used.

D. **Motor Mounting**—Considered as part of the fuselage.

The sum of the above items gives the total weight of the body group.

VII. LANDING GEAR—

A. **Chassis**—(Struts, axle, etc., without wheels). Allow about one and one-half per cent of the total machine weight for the chassis.

B. **Wheels**—See **Table IV** for standard sizes.

C. **Tail Skid**—Allow two or three pounds or calculate the weight from the dimensions.

The sum of these items equals the total landing gear weight.

VIII. WINGS—

A. **Planes Exclusive of Ailerons**—The

weight of the panels depends upon the type of construction. An internally braced wing will be heavier than one externally braced. Data on either type is lacking. The DJ-1 Cantilever wing weighs 1.2 pounds per square foot. This panel is covered on both surfaces from the leading edge to the rear spar with one-sixteenth inch birch plywood for torsional rigidity. There is no data available on light plane wings of the braced type, but it should be possible to build for six- to eight-tenths pounds per square foot.

B. **Ailerons**—Allow seven- to eight-tenths pounds per square foot.

C. **Struts**—If present, estimate sizes and calculate weight from the sketch.

D. **Wires**—(See C).

The sum of these items gives the total wing weight.

IX. EMPENNAGE—

A. **Elevator**—Allow six- to seven-tenths pounds per square foot.

B. **Rudder**—Allow six- to seven-tenths pounds per square foot.

C. **Horizontal Stabilizer**—Allow seven- to eight-tenths pounds per square foot.

D. **Fin—**

E. **Brace Wires**—Allow one pound or calculate from sketch.

The sumof the items, A to E inclusive, gives the total weight of the empennage.

Now add up Groups I to IX for the total weight of the airplane. This total should be compared with the previous estimate. If there is a large discrepancy between these two figures, it may be necessary to revise the preliminary design and repeat the work until a satisfactory agreement is obtained. As each item is constructed it should be carefully weighed and compared with the estimate. It is often possible to eliminate a great deal of weight by lightening up after a part is constructed. The greatest efforts should be exerted to keep the final weight equal to the estimate or if possible under it.

AFTER the detail weight schedule has been completed the balance should be checked. For proper stability the center of gravity is found by first locating on the sketch each item of weight from the schedule. A small circle with the weight of the part marked on it will be found convenient. Next choose some convenient base lines, say the rear face of the propeller flange for longitudinal and the ground line for vertical position of the center of gravity. Multiply the weight in each circle by the distance from that circle to the chosen base line and find the sum of these products. This sum divided by the total weight of the airplane will give the distance from the base to the center of gravity. Two calculations, one for longitudinal and one for vertical position will locate a point which should be put in on the sketch and marked C. G. These calculations will be clear after the example to be given in the next section of this article in May.

If the center of gravity as above located does not lie in the proper place, the wings may have to be shifted and the balance calculation repeated. A line at right angles to the wing chord through the center of gravity should intersect the wing at a point from 30 to 33 per cent back from the leading edge. Similarly the landing gear may have to be shifted. The wheels should be located 15 degrees forward of a vertical line through the C. G. to insure safety on the ground.

If a staggered biplane is used the two wings must be replaced by a mean aerodynamic chord when balancing. This imaginary chord line is located between the wings closer to the wing of large area in proportion to the respective areas. The leading and trailing edges of this M. A. C. lie on lines connecting the leading and trailing edges of the upper and lower wings. The position of the center of gravity should be the same as given above. The biplane is imagined to be replaced by a monoplane of equivalent lifting capacity and location.

The next and last section of this series will undertake the design of a single-seater light plane applying all the data of this and previous sections. This example should clear up any obscure points.

TABLE IV

Weight of Materials of Airplane Construction

Material	Lbs. Cu. In.
Steel	.284
Dural	.102
Al. Bronze	.278
Cast Iron	.261
Brass	.309
Bronze	.295
Copper	.322
Spruce	.016
Ash	.023
Birch	.026
Basswood	.0154
Hickory	.0295
Mahogany	.019
Poplar	.0189
Walnut	.0226

Nut	Lbs.
8-32	.0046
10-32	.0062
¼-28	.0077
5/16-24	.0125

Washer	Lbs.
No. 8	.0007
No. 10	.0007
¼	.0031
5/16	.0031

Turnbuckles, Short	Lbs.
800 lb.	.031
1600 lb.	.062
2100 lb.	.077
3200 lb.	.108

Turnbuckles, long	Lbs.
1600 lb.	.093
2100 lb	.125
3200 lb.	.187
4600 lb.	.233

Clevis Pin	Lbs.
5/32	.0025 plus .0044L
3/16	.004 plus .0056L
¼	.005 plus .012 L
5/16	.0076 plus .02 L

Bolt—Hex. Head	Lbs.
8-32	.004 plus .0053L
10-32	.0056 plus .0074L
¼-28	.007 plus .0134L
5-16	.011 plus .0208L

Sheet	Lbs. Sq. In.
Steel	.284t
Dural	.102t
Brass	.309t
Copper	.322t

Tubes	Lbs. Per Ft.
Steel	10.7 (Dt-t2)
Dural	3.85 (Dt-t2)
Brass	11.66 (Dt-t2)
Copper	12.15 (Dt-t2)

Wires	Lbs.
Strm. No. 6	.033 plus .002 L
No. 10	.064 plus .035 L
¼	.132 plus .066 L
5-16	.237 plus .0104L
3-8	.392 plus .0157L

Galv. Wire	Lbs. 100 Ft.
No. 20	.273
No. 18	.434
No. 16	.690
No. 14	1.097
No. 12	1.744
No. 10	2.77
No. 8	4.

Galv. Cable	Lbs. 100 Ft.
1-16	.78
3-32	1.21
1-8	3.5
5-32	5.5
3-16	7.7

Flex. Cable	Lbs. 100 Ft.
1-16	.73
3-32	1.3
1-8	2.88
5-32	4.44
3-16	6.47

Thimbles	Lbs. per 1000
1-16	3.00
3-32	3.00
1-8	4.3
5-32	6.5
3-16	9.0

Ferrules	Lbs. per 1000
No. 20	.52
No. 18	1.14
No. 16	2.09
No. 14	4.25
No. 12	8.56
No. 10	17.56
No. 8	4.4

Wing Cover Doped	Lbs. Sq. Ft.
Single Surface	.1
3 Ply	
3-16	.175
1-16	.2
3-32	.35
1-8	.4
3-16	.5
1-4	.65

Wheels	Lbs.
20 x 2	7.5
24 x 3	12.25
26 x 3	13.5
26 x 4	17.5
28 x 3	14.9

NEW WAR WEAPONS

The French 75 with a limited traverse, an elevation of 19 degrees, and a range of 9700 yards was probably the favorite field artillery weapon of the World War. The Ordnance Department has perfected a new 75 that has a traverse of 40 degrees, an elevation of 45 degrees, and a maximum range of 15,000 yards. Tanks, motor vehicles, troops, supply stores, and strong points will find this development a trifle embarrassing, to say the least.

The new 105 uses a projectile double the weight of the 75 shell and reaches 12,000 yards in its search for enemy positions.

The World War 155 mm had a range of 18,000 yards, whereas the newly designed 155 mm gun has a range of 25,000 yards or over 14 miles with an elevating angle of 65 degrees and a traverse of 60 degrees. It fires a 95 pound projectile. The companion piece of this weapon is an 8 inch howitzer with a range of 18,000 yards, as opposed to the type used in the world war with ranges from 11,000 to 12,000 yards. The projectile used weighs 200 pounds.

The new anti-aircraft guns have exceptional mobility, high muzzle velocity, and out-class in every respect World War guns of this type.

The new railroad artillery fires a 1600 pound projectile 23 miles. The 16 inch guns for harbor and Panama Canal defense hurl a 2000 pound projectile 27 miles toward its objective. And, as if to make sure that the personnel of the 16 inch weapons may have something to concern themselves over, it is announced that aircraft with an indefinite range of action are prepared to present their compliments in the form of bombs weighing from 100 to 4000 pounds each. The two ton bomb is guaranteed to dig a hole 180 feet in circumference and more than three times the depth of the average man's height. Coal mines should be a popular rendezvous in the next war.

RECORD OF MODEL AIRWAYS

A resume of the operations of the airways system of the Army Air Service from its beginning in the fall of 1922 to March 1, 1925, shows the following:

Number of completed flights, 480.
Miles flown, 692,700.
Passengers carried, 688.
Express carried, in lbs., 56,280.
Crashes, 15.
Fatalities, none.
Injuries, 1.

The model airways system is being conducted by the Army Air Service as an incidental function in its training and practice. On airway flights data is collected on meteorology, landing fields, efficiency and stability of airplanes, and motor efficiency. Valuable experimental work in instruments for aerial navigation is also conducted. The Signal Corps of the Army cooperates with the Air Service by furnishing weather reports. "Recruiting News."

ARMY PLACES BIG CONTRACT FOR OBSERVATION PLANES

The War Department has awarded $70,000 to the Curtiss Co. and $60,000 to the Douglas Co., for the experimental observation airplane manufactured by each of these companies, and the development work involved in the production of these planes.

The Army Air Service is seeking a safer and more maneuverable type of airplane for general observation use that will replace the war-built DH's. The awards were made as a result of tests conducted at McCook Field, Dayton, Ohio, on January 23 by a board of officers convened for that purpose. Members of the board were all expert aviators or observers and made actual tests of the new designs of observation airplanes which had been submitted by the Curtiss, Douglas, Wright, and a number of other companies.

AIRCRAFT DEVELOPMENT CORP., NOT IN PRODUCTION

Various newspaper and magazine articles have been noted by the Editor of "Slipstream" announcing in extravagant manner how this Detroit concern is about to launch forth in the production of huge metal-clad airships for regular service between New York and London.

Ralph Upson, Chief Engineer of the Corporation, has issued a statement asking us to publish it and explain to fellow aeronautical engineers the real plans of the organization.

The statement follows:

"The Aircraft Development Corporation, as now constituted, is not organized for commercial construction or operation of airships, but only for development work, as the firm name indicates. As a result of several years of intensive work at the Detroit laboratory in the development of a practical metal-clad airship—that is, one having an outer envelope made entirely of metal—the company has now reached the point where the preliminary study and research are ended.

"Toward the end of last year the company had practically finished the design of a demonstration ship of 80,000 cubic feet capacity, an unprecedented small size for a rigid airship, and especially remarkable considering the metal type of construction involved.

"Due to certain Government requirements which were beyond the capacity of such a small unit, not much larger than a free balloon, it has been decided more recently to increase the size to 200,000 cubic feet, permitting a very marked improvement in carrying capacity, speed and cruising range. This new design, designated as the MC-1 is now in progress."

The editor is also in receipt of a recent communication from Matt Q. Corbett, aeronautical engineer, who left the Government Service some months ago to join the ranks of this company. Mr. Corbett, a well known figure in lighter-than-air developments, has just perfected a small experimental airship of fabric construction to be used in "insect dusting." Mr. Corbett states that he has located a cheap source of fabric supply and has made contact with an expert Henderson engine man. With the technical help of the Aircraft Development Corporation, Mr. Corbett states that he expects to bring the first ship well under four thousand dollars.

This project of course should be regarded as entirely separate from any main undertaking of the company, and the organization should not be directly identified with this experiment, it being primarily perpetrated by Mr. Corbett.

"MONTY" IS AUTHOR OF NEW BOOK

Those in air circles who have received with so much popular favor the first edition of the hand book issued by the Army Air Service under the authorship of Lieut. Montieth and titled "Simple Aerodynamics and the Airplane," will be pleased to know that a second edition of this publication has just been completed at the McCook Field print shop.

It is said that this second edition of "Simple Aerodynamics and the Airplane" is even more valuable than the first. Two hundred copies of the latter edition have been run and forwarded to West Point Military Academy where they will be used as a standard text book. Professor Parker, at the head of Standard and Experimental Philosophy at West Point in a letter to Major J. F. Curry, Commanding Officer of McCook Field, expressed the highest praise for the new book.

It is expected that due to the great general demand for this book, the Government will permit it being placed upon the commercial market. In a recent conversation held by the editor of "Slipstream" with the author the view was expressed that the book would be available on the commercial market about August 1, 1925.

ENGINE DYNAMICS AND CRANKSHAFT DESIGN

By Glenn D. Angle

The office of "Slipstream" is in receipt of the first edition of the new book by Glenn D. Angle, consulting engineer, formerly in charge of the design of airplane engines at McCook Field, Dayton, Ohio.

Although the airplane engine has been broadly written up by technical writers, there are few if any publications compiled particularly for the designer. Perhaps the reason why books of this nature have not appeared heretofore is, that those sufficiently experienced to undertake their preparation did not feel the task to be warranted during the course of such rapid experimental progress.

Although the design of airplane engines had its greatest impetus during the late world war, the more scientific developments have occured since. There is a vast amount of experience and data available which should guide future developments along more constructive lines.

"Engine Dynamics and Crankshaft Design" covers in a complete and comprehensive manner the most important subjects, including such as: a description with data on all of the various types of construction; an outline of proven stress analysis, together with practical examjles, as well as an authoritative and detailed discussion on design in all of its phases. The book which is the first of a series under the heading of "Airplane Design" is published by the Airplane Engine Encyclopedia Co., General Motors Bldg., Detroit, Mich.

FRANCE GAINS NEW RECORDS IN AVIATION

France will gain six new world's records in aviation, if performances credited to the French pilots, M. Doret and M. Descamps are confirmed by the Federation Aeronautique Internationale. Unfortunately for Czecho-Slovakia, a country which only recently had her name placed on the honor roll with four aviation records, will lose all of them as the result of the performances of the aforementioned French pilots. The United States will lose one, and the remaining one is not a gain, as it was formerly held by a French pilot. With the confirmation of these six records, the United States will hold 53 out of the 78 world's records made in heavier-than-air craft, France 19, Denmark 5 and Sweden 1.

On December 23rd, M. Doret, flying a Dewoitine D.1C.1 monoplane with a 300 h.p. Hispano-Suiza engine and 1924 type Lamblin radiator over the Villesauvage-La Marmogne-Villesauvage circuit of 100 kilometers, broke the previous speed records for 100, 200 and 500 kilometers, while carrying a useful load of 250 Kgs. (570 pounds), averaging for these distances 231,392 k. p.h. (144.62 mph), 225,705 k.p.h. (141.065 mph), and 233.988 kph (139.99 mph), respectively. The records for 100 and 200 kilometers were held by Sgt. F. Lehky of Czecho-Slovakia, whose average speed was 226.272 and 202.988 kilometers per hour, respectively, Adjutant Feimy of France held the speed record for 500 kilometers (196.94 kph). Mr. Doret bettered this mark by 27.048 kph.

On December 29th, over the same course, M. Doret attacked the speed record for 1,000 kilometers (205.06 kph), held by Lt. H. R. Harris and Ralph Lockwood, U .S. Army Air Service, and bettered the mark by 16.64 kph, his record being 221.7 kph.

It is reported that the Frenchman was decorated with the Medaille Militaire for these performances.

On January 10th M. Descamps, flying a DeMonge 101C.1, fitted with a 380 hp Gnome-Rhone Jupiter Engine, over the Villesauvage-La Marmogne circuit, and carrying a useful load of 500 kgs. covered 100 kilometers at a speed of 206.42 kph (127.98 mph) and 200 kilometers at 205.85 kph (127.61 mph). These two records were held by Czecho-Slovakia, Capt. J. Kalla holding the 100 kilometer record at 202.133 kph, and Sgt. Kaspar holding the 200 kilometer record at 189.219 kph.

It is reported that M. Descamps is preparing to attack the 500-kilometer record now held by Louis G. Meister of the U. S. Army Air Service.

MICHIGAN COMMERCIAL AIRMEN COMBINE

TALBERT ABRAMS, well-known figure in commercial aeronautics and president of the A-B-C Air Line, Inc., of Eaton Rapids, Mich., writes that there reecntly met at Lansing in the first annual banquet a group of forty commercial aviators who represent members of the newly organized Michigan Commercial Aviators Association.

The sumptuous banquet was held in the dining room of the Elks Temple, Lansing, and delegates from every phase of commercial aviation in Michigan freely discussed the vital needs of all concerned.

Officers of the organization were elected as follows: J. L. Burns, President; E. H. Goff, Vice President; Talbert Abrams, Secretary and Treasurer.

Committees were formed to draft by-laws, aid in securing landing fields for municipalities that would be available to all flyers, sponsor air meets in various communities, exploit the U. S. Air Mail Service for Michigan and perfect a system of Model Airways in Michigan whereby passengers wishing to avail themselves of airway transportation could take advantage of those companies operating within their respective districts with the least possible delay. The association will also act as a clearing house for all plans tending toward a betterment of this commercial service. Membership is limited to pilots, owners and heads of organizations interested in commercial aerial transportation.

Mr. Abrams concludes his cordial communication with the following cheerful word for "Slipstream": "The position you hold in things aeronautical is enviable indeed, and the esteem, respect and appreciation the flyers of Michigan hold for your publication in regard to the pioneering work you have carried on against great odds prove conclusively that only with such a fighting spirit can commercial aviation be perfected and universally adopted without reserve."

* * * *

It is a source of great encouragement for the publisher of "Slipstream" to receive a friendly word now and then from those in the game. It need not be repeated that the publisher of the aero magazine must INDEED work against great odds. It should behoove the industry therefore to remember the publication which remains loyal during the dark period and allow it to render its full service as an advertising medium and organ of the trade. Without this the publication avails nothing either to the trade or to the publisher. It is only natural that after the publisher of such a magazine spends his best years and a small fortune to make it of use finds that it is received with indifference, he become lacking in the necessary ambition to go out and study the condition of things. His magazine becomes "gloomy," pessimistic and without the smack and vim one should care to identify the mouthpiece of a new and progressive industry.

NAVY FLYERS EXPLORE UPPER REALMS

Beginning March 24 arrangements were made at the Naval Air Stations, Anacostia, D. C., for a special daily flight of a Navy plane carrying an aerological observer and instruments to record the air temperature and humidity far above the earth's surface. The unknown conditions of the atmosphere at several thousand feet altitude have in the past injected a hidden quantity in weather forecasting calculations, particularly in "long range" forecasts. The conditions of the extreme "upper air" exert a very direct influence on weather conditions at the surface and with the recent use of aircraft appreciable increase in accuracy of weather forecasting has been made possible. These more recent tests are expected to bring out more valuable data.

The especially trained Navy aerologist, will carry with him on his journey to the frigid realms of the upper ether recording thermometers and baragraphs which will record conditions with mathematical accuracy. Lieutenant L. T. Hundt, Naval aerologist officer and R. J. Brown, chief aerographer and aerometrographer, have been assigned to the work.

PAUL REVERE IN MODERN STYLE

One if by land,
Two if by sea,
And three if they come
By the air, b'gee!

COVINGTON (KY.) HAS NEW FLYING FIELD

Hundreds of persons including army and national guard officers attended the exercises at Covington, Ky., on March 29, which marked the formal opening of Crescent Field, new municipal airdrome. James Kehoe, adjutant general of Kentucky, was the principal speaker.

Although a number of planes from Dayton and other cities were expected, weather conditions prevented their participation in the exercises.

AIR FREIGHT BARS NOTHING

There is no limit to the variety of freight and express that can be handled by airplanes. Recently we read of a live aligator being transported from the Florida swamps to a New York zoo. A British aeronautical publication, "Airways," states that on the Western Australia Airways, day-old chicks are transported to destinations over one thousand miles away. A Mr. Parkinson, who makes the shipment, now heralds the inauguration of the "incubator airplane." A later associated press note from London states that on March 29 two and a quarter tons of gold were carried by two airplanes from London to Paris.

RUSSIA IN HEAVY AIRPLANE MARKET

"Stolid, backward, dark Russia" appears an off-color expression for progressive Americans to utter when it is learned that the Russian air program for 1925 provides for the acquisition of 1030 new airplanes, of which number 500 are to be built in Russia, chiefly by the Russian Junkers Co., 330 are to be ordered from the Fokker Co., and 200 from various Italian firms. During the first six months of 1924 Russia purchased about 700 modern aircraft in Holland and Italy.

ENGLAND-BURMA FLIGHT ENDED

Air Vice-Marshal Sir William Sefton Brancker, director of Civil Aviation in the British Air Ministry, with his pilot, Alan Cobham, and mechanic, Elliot, arrived March 17, at Croydon Airdrome, London, at the end of their 17,000 mile air journey, from England to Rangoon, Burma, and return.

Upon his arrival Sir William declared that with sufficient money he was convinced that a commercial air line could and should be inaugurated from the British Isles to Egypt, India, Burma and Australia. A DH-50 (Siddeley Puma Engine) plane was used on the flight.

SERVICE MEN DO "HUMAN METEOR" STUNT

Staff Sergeant Randel L. Bose and Corporal Arthur Bergo of the Army Air Service and stationed at Mitchell Field, dropped over 1500 feet from an airplane in the clouds from an elevation of 35000 feet before pulling the rip cord on their parachutes. The two daring soldiers leaped from the wings of the speeding plane, allowing their bodies to fall this great distance to disprove the theory that a fall from a considerable height causes unconsciousness or death before the body strikes the ground.

Under the direction of Lieutenant M. I. Elliot, A. S., the two students made the delayed parachute jumps and claim that they experienced no stirring sensations during the fall, being in complete control of their senses throughout the test.

McCOOK PHOTOGRAPHERS TAKE UNIQUE FLASH VIEW

SETTING off fifty pounds of photo flash powder, McCook Field photographers on the night of March 27, procured a photograph covering a radius of many acres. The test was made to determine the practicability of securing photographs of this nature for military purposes. The photo which was taken by Lieutenant Goddard in charge of aerial photo work at McCook Field, is said to be completely successful and adds another accomplishment of considerable value to Army Air Service Engineering Division experiments. Residents of Dayton were awe-stricken by the explosion and bright glow in the sky, the report being spread that a huge meteor had fallen in the city.

NAVY PLANES QUELL INSURRECTION

Naval seaplanes in Panama were pressed into service for speedy transportation of American diplomatic representatives in connection with the recent uprising of the San Blas Indians. The incident is reported by the Naval Air Station at Coco Solo, Panama Canal Zone, as follows:

The San Blas Indians inhabit the sea coast and islands of Panama between Porto Belle and Puerto Obaldia. The Panamanian Government has for some years been exercising police, educational and quasi-political functions in this region. The Indians, however, maintain their own tribal political organizaton and have resented the presence of Panamanian police and school teachers.

Recently during the Carnival Season, the Indians rebelled and murdered twenty-two Panamanians, mostly police. Excitement ran high. The Panamanian Army (which is also the local police) was hurriedly embarked aboard chartered yachts and tugs which took them to San Blas Gulf, the center of the disturbance. The United States Minister to Panama, with various Panamanian Government officials, also went to the scene aboard the "USS Cleveland."

After negotiations started, it became necessary for the U. S. Minister, the Hon. John Glover South, to return to Panama and he radioed on the morning of March 2 for a plane. One hour later, two twin-engined seaplanes, type F-5-L, left the station. The planes landed alongside the "Cleveland" in San Blas Gulf, and Minister South and his party were transferred by boat to the planes; one hour and thirty-five minutes later Minister South was landed in Balboa, an air line distance of 120 miles from the "Cleveland."

The use of the planes made possible the settlement of the San Blas rebellion a week earlier than could have been done otherwise.

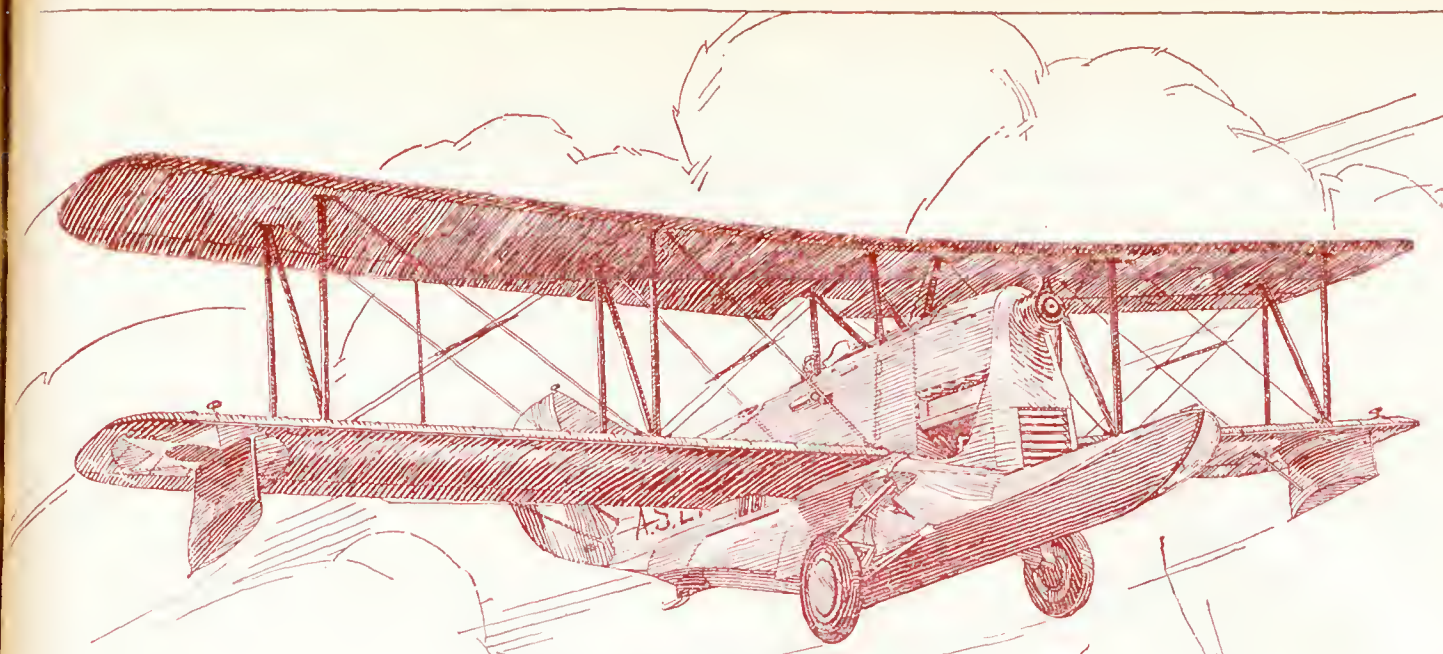
NEW AMUNDSEN POLE FLIGHT SCHEME

A report from Oslo, Norway, dated April 1, states that the noted polar explorer, Raold Amundsen, left Oslo on that date for Tronso, Norway, and thence to Spitzenbergen from which latter point he will start on a proposed airplane flight over the North Pole.

It will be remembered that a similar project started last year and that an American naval-officer was "loaned" by our Government to pilot one of the planes. An extensive publicity scheme was launched in this country and abroad, with the sale of post cards, which presumably would be franked from the Pole. The idea was to raise money to help defray the expense of the flight. The attempt was abandoned and as for the many thousands of post cards sold over the world it is not yet certain what became of them or—but let us not start another one of those air probes.

DOUG. FAIRBANKS SOLVES AIR PROBLEM

At last, the non-diving, landing-at-no-miles-per-hour, terrific-top-speed airplane has been produced and flown by—Douglas Fairbanks in the "Thief of Bagdad." It is called a magic carpet and certainly seems to be an excellent vehicle, though one did see a certain tendency to spin on occasion. So says a scribe under "Croydon Notes," in a foreign aero journal.



A New Bird—
The Loening Amphibian

TAKING off in a rough sea, or swooping down like a hawk to a landing field—is easy for the new amphibian, built for the Army Air Service by the Loening Aeronautical Engineering Corporation.

Daring in design, the amphibian can be changed instantly from land-bird to sea-bird by the touch of an electric switch. And due to its low center of gravity and the pontoon protection under the propeller, it is seaworthy even in the roughest of waters.

The builders of this sturdy craft demanded the best in finishes, of course—Valentine's! All metal parts are finished with Valentine's Navy Gray Alumaloyd Enamel. Mr. A. P. Loening, Vice-President of the Loening Company, writes "Not only has your Enamel stood up well, but the fine finish which it gives to the machine has been very favorably commented upon."

Leading designers and builders everywhere, are finishing their planes and sea craft with Valentine's Varnishes and Enamels. For the name Valentine on finishing materials stands for service and durability that cannot be equalled.

The photograph above shows the new Loening Amphibian emerging from its hangar. This entirely new type of American metal airplane has for the past year been undergoing secret development at the Loening plant in New York City.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

SPEED WITH SAFETY

Curtiss Carrier Pigeon

THE Air Mail Division of the United States Post Office Department is the greatest exponent of commercial aviation in the world. Having successfully proved over an operating period of eight months that a day and night schedule between New York and San Francisco was feasible and practical, the next step was to obtain aeroplanes that, with the same faithful Liberty motors and with the same or better performance, would double the pay load, thus doubling the income, without materially increasing the operating costs. The Curtiss Aeroplane and Motor Co., Inc., were quick to see the opportunity, and developed for the Air Mail Service, the Curtiss Carrier Pigeon.

On the official tests this machine made the following remarkable performance with full fuel load and a pay load of one half a ton, twice that of the present DH.

High speed	128 MPH	Cruising speed at 1500 RPM, 108 MPH
Landing speed	50 MPH	Ceiling 16,200 feet
	Climb 1,000 feet per minute to 3,000 feet	

The official cross-country flight of one hundred miles was made in fifty-nine and one-half minutes on twenty gallons of gasoline.

Five miles per gallon - Five cents per mile - Ten cents per ton mile

This is Commercial Aviation with Real Economic Possibilities

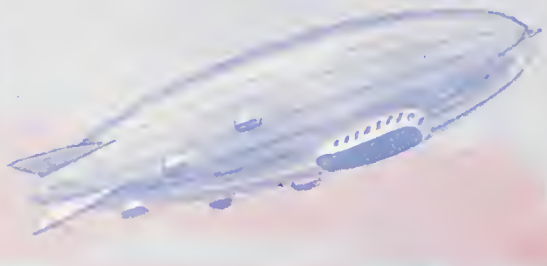
Curtiss Aeroplane & Motor Co., Inc.

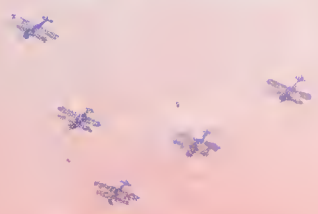
Garden City, N. Y.

May 1925

SLIPSTREAM

DEVOTED TO AVIATION





The Commercial Flyers' Magazine

DAYTON
The NATION'S AIR CENTER

HASENSTAB DAYTON OHIO

$2.00 PER YEAR

25¢ PER COPY

OUR NEW AIRCRAFT BARGAIN SHEET

AIRPLANES

TERMS: Cash with all orders of $25.00 or less, above that amount 50% required with order, balance C. O. D.

1 new Lincoln Standard four-passenger Cabin plane equipped with 180 Hispano-Suiza motor, 56 gal. gas tank, finished in maroon enamel with gold bronze wings, double aileron, has excellent performance, doing 84.7 m.p.h. in 110 mile race at St. Joseph in October, '23. Special price on this beautiful job $2750.00

1 Martin R, rebuilt and in beautiful condition, equipped with 200 HP L6 motor, carries five passengers, a BIG BARGAIN at $2500.00

1 Fokker D7 type rebuilt, two passenger equipped with new 150 Hispano-Suiza motor, carries 52 gal. gasoline, just refinished with New Grade A linen, six coats nitrate pigmented bronze dope. We figure this one of the most efficient and beautiful jobs in America. Won 110 mile at St. Joe, October, 1923, averaging 117.4 m.p.h. Special price on this job with motor $2250.00

Without motor ..... $1600.00 Same job with new OX5's $1175.00

Several OX J-1 Standards, without motor ..... $ 950.00 Same job with overhauled OX5 motor $1075.00

We wish to impress upon your minds that these ships are all covered with new cloth, six coats pigmented silver dope, aluminum cowlings, 35 gal. gas tank and finished with the same care as the Lincoln Tourabout.

New Standard fuselage, with controls, 35 gal. gas tank, Hall Scott motor mounting ..... $ 350.00

Standard fuselage, less controls and gas tank, Hall Scott motor mounting ..... $ 225.00

Complete Standard fuselage and wings in knockdown form, including three wheel landing gear ..... $ 195.00

We have the largest stock of new Standard J-1 wood parts in the United States. Our prices are so reasonable that you cannot afford to make these up. Write us your wants. A deposit of $250 will hold any of these planes 30 days.

NEW STANDARD J-1 FITTINGS

FUSELAGE

Center and rear seat rail clamps	.11
Control clevises, drop forge	.12
Control bearings	.85
Control wire pulls	.08
Control bearing back plates	.05
Engine bed cross piece sockets	1.17
Floor board clips	.10
Fitting sockets	.02
Front wing roots, fuselage	1.15
Fuselage hand grips	2.15
Instrument board clips	.06
Oval rubber guides	.10
Rear engine bed sockets	2.15
Rubber wire spreaders	.01
Rubber stick grips	.25
Sockets, longeron nose plate	.40
Strut sockets	.30
Safety belt loops	.15
Seat cross piece fittings	.18
Steel plates for engine beds	.30
Station 1, upper and lower, each	.20
Station 2, upper	.32
Station 2, lower	.48
Station 3, lower (fuselage-landing gear) pin type	1.90
Station 3, lower (fuselage-landing gear) plate type	1.80
Station 3, upper	1.70
Station 4, upper	.60
Station 4, lower	.45
Station 5, lower (fuselage landing gear, rear) pin type	1.90
Station 5, lower (fuselage landing gear, rear) plate type	1.80
Station 6, upper and lower, each	.45
Station 7, 8, 9, upper and lower, each	.40
Station 10, upper lower, each	.60
Station 11, upper and lower, each	2.15
Tank brackets	.27
Wire clips, Sta. 5, 6, 7	.02
Wire pulls, Sta. 11	.20

WING

Aileron hinges	.22
Aileron horns	.80
Cabanes	2.15
Aileron pulley link	.30
Cooper wire trailing edge clips	.02
Internal wing fittings	.40
Overhang flying fittings, No. 2888	.35
Upper wing plates, No. 5279	.20
Upper wing overhang wire pulls, No. 3084	.10
Wing hinges	1.95
Wing pins	.22
Wing hinge U's	.05
Wing skid plates, No. 5681, No. 5683	.95
Wing external fittings, No. 5132, No. 5133, No. 5528, No. 5530, No. 5531, No. 5532, each	1.05
No. 5137, No. 5138, No. 5518, No. 5519, No. 5534, No. 5536, each	.95
No. 5145, No. 5515, No. 5517, No. 5516, No. 5535, each	1.00

TAIL

Center rudder bearings	.20
Elevator bearings	.20
Elevator and rudder rib fittings	.17
Fin double wire pulls	.10
Tail skid rubber loops	.15
Tail skid rubber loop U's	.15
Upper fin bearings	.08

LANDING GEAR

Axle collars	.12
Brass axle washers	.10
Flanges for landing gear	.08
Half flanges for landing gear	.06
Landing gear pins	.05
Strut sockets, pin type	1.25
Strut sockets, plate type	1.80
Three wheel landing gear lower fittings complete with wire pulls	3.60
Three wheel landing gear spools	1.30
Two wheel landing gear lower plate fittings	4.70
Wire pulls	.18

SPECIAL BARGAIN PRICE ON COMPLETE SET STANDARD J-1 FITTINGS $7.50

LANDING GEARS

Standard J-1 Two wheel pin type complete, less wheels .... $ 85.00 New Steel type less wheels such as used on LS5 ..... 85.00

Two wheel plate type, complete, less wheels ..... 75.00 Three wheel pin type, complete, less wheels 37.50

Landing gear wood V's ..... 17.50 Spreader boards, each ..... 3.75 Axle for 26x4 wheels 4.50

WINGS—STANDARD J-1

Complete set wings, two uppers and two lowers, new cloth, 6 coats pigmented silver dope 200.00

Upper wing, new cloth, new dope ..... 90.00 Lower wing, new cloth, new dope 60.00

We do not offer wings of original linen as same is eight years old and unfit for safe flying.

AILERONS, RUDDERS, ELEVATORS, STABILIZERS—STANDARD J-1

Rudder, new cloth, new dope ..... $ 9.75 Aileron, new cloth, new dope 18.50

Elevators, new cloth, new dope ..... $37.50 Stabilizers, new cloth, new dope 27.50

Vertical fin, new cloth, new dope 4.50

Large type balance rudder and fin, steel tubing construction such as used on LS5 complete with new cloth, new dope 47.50

INSTRUMENTS

Oil gauges, 60 lb., 120 lb.	$ 2.75	Altimeter, 12,000, 15,000 ft.	6.00	Tachometer head, Johns-Manville	6.50
Gasoline gauges	3.00	Air gauges	.65	Knife switch	.50
Double Dixie switches	1.90	Air hand pressure pump with or without shut-off	2.00	Gas connection shut-off to carburetor	1.00
Heat gauges, Foxboro	11.00				

We have a complete line of gasoline shut-off pet cocks, unions, and any make of brass connections. We are selling them in any amount for 50% actual wholesale cost. Write for size and quantity wanted.

AIRPLANE MATERIAL

WIRE & CABLE

1/8" Roeblings Aircraft strand	per ft. 3c
5-32" Roeblings flexible cable	per ft. 4c
In 1,000 ft. lots	per ft. 3c
No. 8, 9, 10 aviator hard wire	per lb. 30c
Packard three strand ignition cable	per ft. 3c

MISCELLANEOUS

Brass wire, soft 1-16"	per lb. 28c
Black shock absorber	per ft. 5c
Copper gas tank outlets	each 35c
Clevis pins	per C $1.00
Ferrules, No. 8 and No. 9	per C $1.25
Gas tanks, 35 gal.	each $9.50
Oil oak stain, 5 gal.	$5.00
Sheet aluminum, 16 and 18 ga., 4'x12'	per lb. 50c
Shelby seamless steel tubing, sizes to 1", 10c per ft., over 1"	per ft. 15c
Tape, 2 1/4" pinked	per yd. 4c
Tape, 1/2" wishbone	per yd. 2c
Thimbles, 1-16", 3-32", 1/8", 7-32"	per 100 $1.00
Turnbuckles, any size	per 100 $8.50
Wire clevis, each	7c

BOLTS, NICKEL STEEL

3-16"x3/8", 1/2", 5/8", 3/4", 1", each	.01
1/4"x3/8", 3/4", 1", 1 1/8"	.01 1/2
1/4"x3 3/4", 3 5/8", 4 1/2", 4 5/8", 4 3/4" each	.03
1/4" ball face x 3", 3 3/8", 3 1/2", 3 5/8", 3 3/4", each	.03
1/4" ball face x 3 3/8", 4 1/8", 4", 4 3/8", 4 1/4", 4 3/4", each	.03 1/2
Eye bolts, 5-16"x2 1/2"	.17
Eye bolts, 7-32"x1 1/4"	.08
5-16"x1", 1 1/2", 1 3/4", each	.02
5-16"x2 1/2", 2 5/8", each	.03
3/8"x1", 1 1/4", 1 1/2", each	.02
3/8"x2 1/4", each	.03
3/8"x5", each	.04

MOTORS

New 150 Hisso built here in our factory of all new parts .... $595.00 180 Hisso, overhauled and in A-1 condition $575.00

New 180 Hisso, same construction 645.00

150 Hisso, used but in first class condition ..... $400 to $500.00 220 Hisso, overhauled ready for installation 275.00

WE MAKE MOTOR EXCHANGES

Send in your Hisso and we will make an exchange for one with new bearings, new rings and in condition to do at least 150 hours at a very reasonable price. Write exact condition of your motor and we will quote prices by return mail.

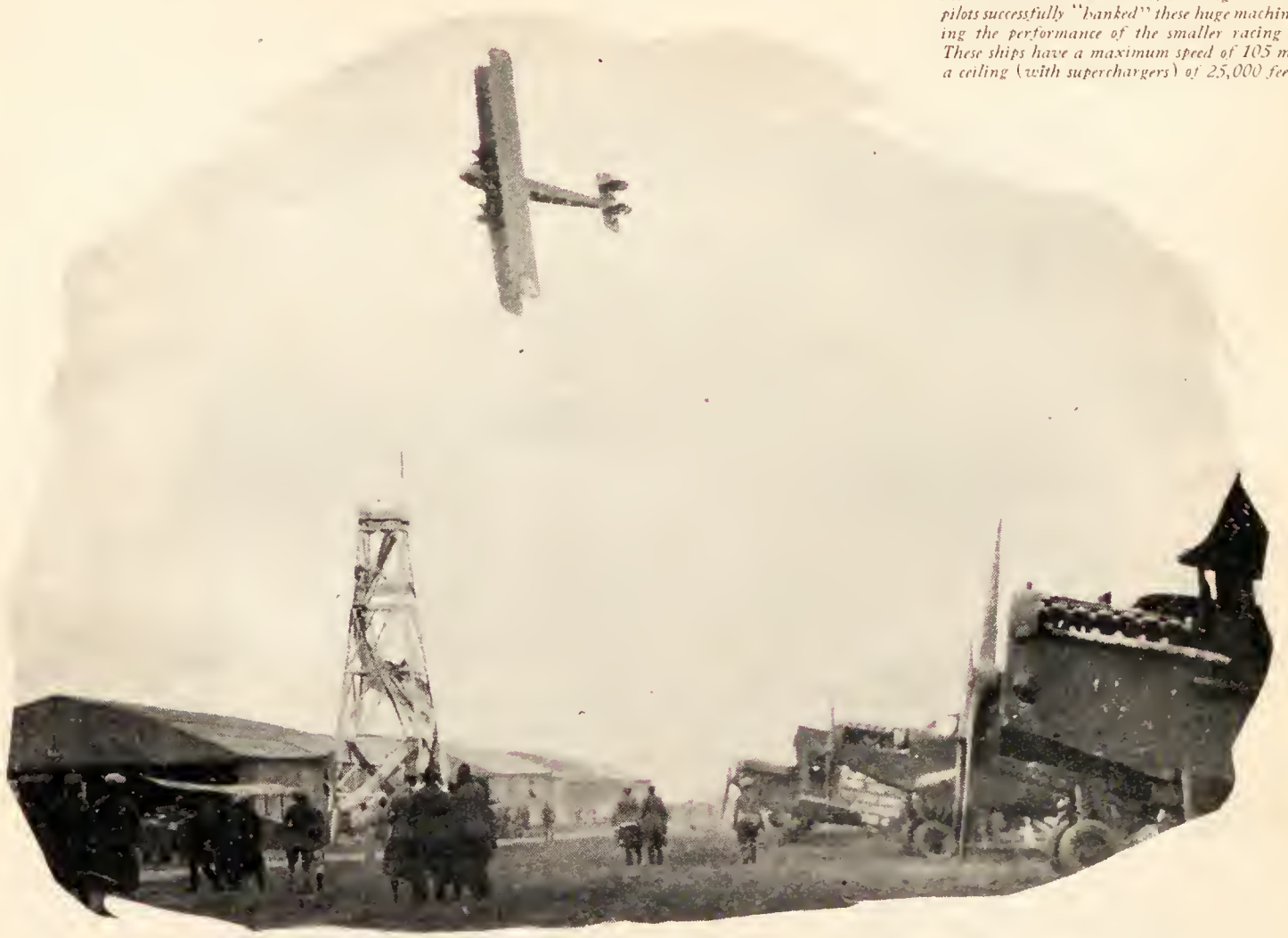
If you do not find listed parts or material you need, write us. WE HAVE EVERYTHING FOR A STANDARD SHIP AND HISPANO MOTOR.

WE HAVE STOCK OF NEW CARBURETORS AND CARBURETOR PARTS. WRITE US YOUR WANTS AND WE WILL FURNISH PRICES BY RETURN MAIL.

WIRE MONEY AND ORDER BY NIGHT OR DAY LETTER AT OUR EXPENSE IF ORDER IS OVER $25.00. WE GUARANTEE SHIPMENT WILL BE IN HANDS OF EXPRESS COMPANY WITHIN ONE HOUR AFTER RECEIVING YOUR WIRE.

GET OUR LIST AND PRICES ON HISPANO MOTOR PARTS, 150, 180, 220 HP

LINCOLN STANDARD AIRCRAFT CORP. LINCOLN, NEBR.



A Martin Bomber, Type MB-2, rounding the pylon at the International Air Races, showing how the daring pilots successfully "banked" these huge machines, matching the performance of the smaller racing machines. These ships have a maximum speed of 105 m.p.h. and a ceiling (with superchargers) of 25,000 feet.

A King of the Air

In the early days of aviation, the Doubting Thomases shook their heads and said the airplane was impractical for transporting heavy loads.

Today they look with wide-open eyes at the Martin Bomber, illustrated above, the weight of which when empty is 7,000 pounds and, in addition, can carry a load of 5,000 pounds, making a total weight sustained of 12,000 pounds—six tons.

Obviously, it requires skill to land a ship of such weight, and one can easily imagine the stress and strain to which the wheels of such a craft are subjected, both in landing and in taking off.

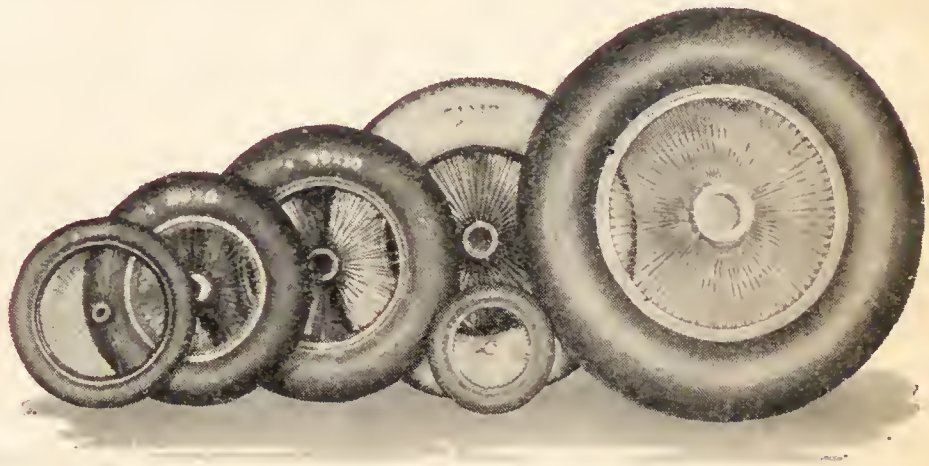
However, the Glen L. Martin Company have solved that problem by using Dayton Wire Wheels on all Martin Bombers.

This selection of Dayton Wire Wheels again demonstrates their dependability for—

"The Man Who Drives or the Man Who Flies"

The Dayton Wire Wheel Company

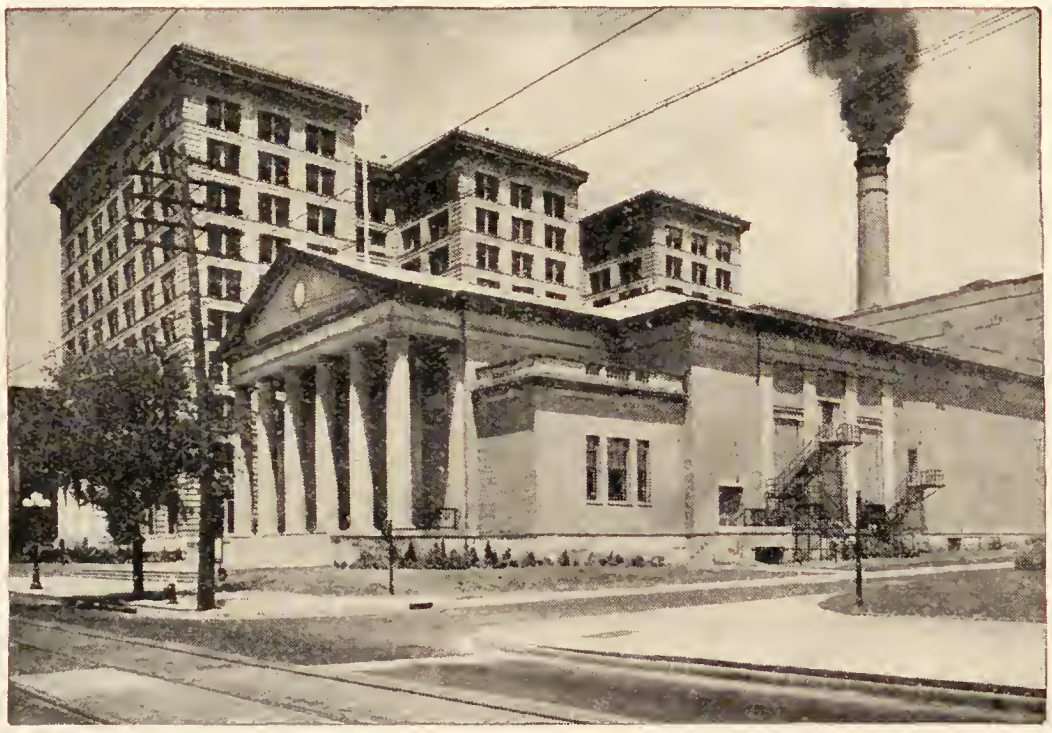
Dayton, Ohio



The 44x10 wheel shown in above group, streamlined to cut down wind resistance, is the type of wheel used on the Martin Bomber pictured above.

Dayton Wire Wheels

QUICK DETACHABLE



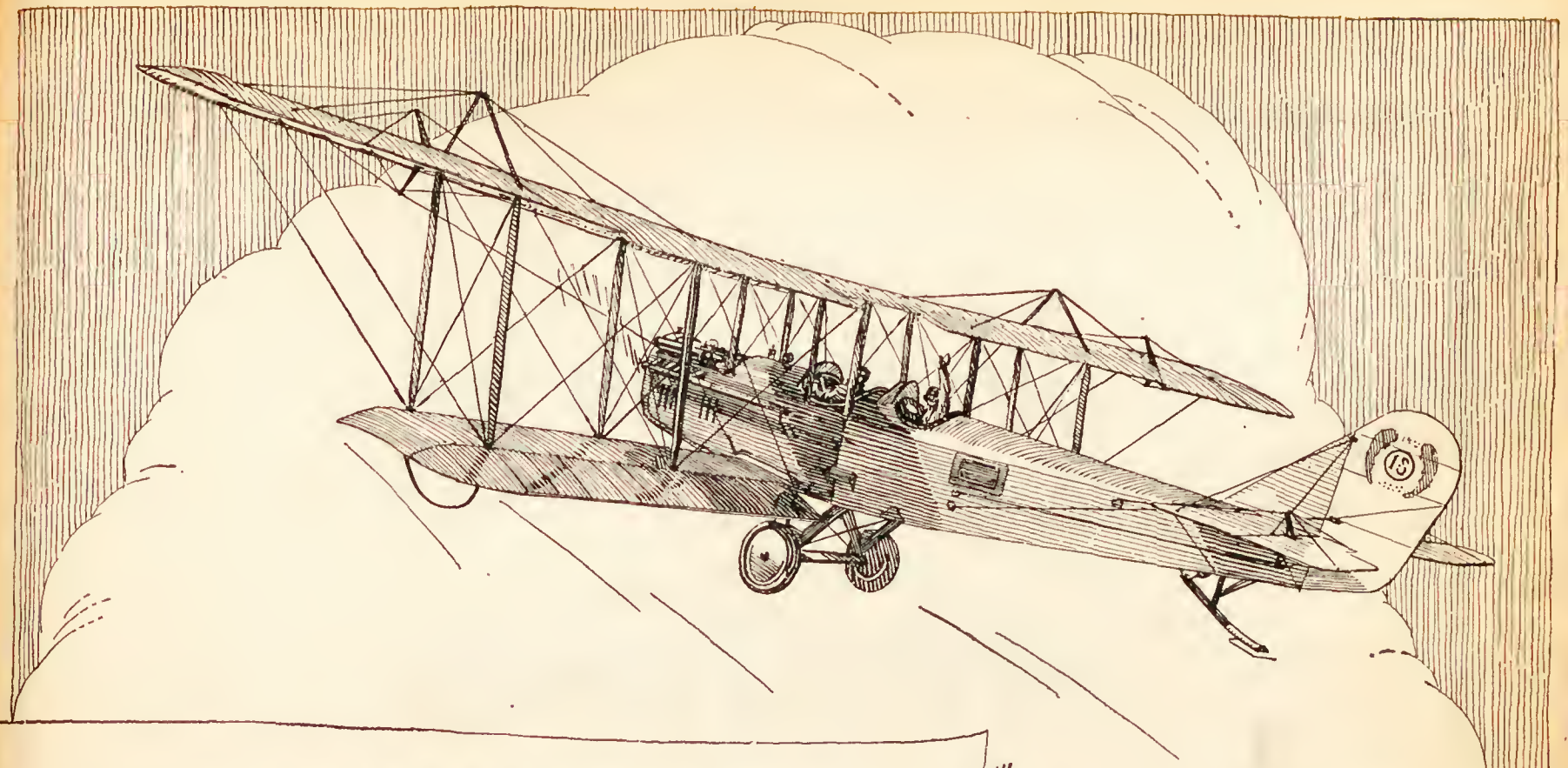
An Industrial Schoolhouse

THE N C R Schoolhouse is one of the largest and best equipped schoolhouses of its kind in the country. It holds a very definite place in our business. It is here for the benefit of our employees and to promote social and educational welfare.

Noon-hour entertainments for employees, Saturday morning children's meetings, business men's conventions, civic meetings and health and educational lectures are some of the things for which this hall is used.

This Schoolhouse is just one of the many things which make a visit to our factory an interesting one. Trips through the factory with competent guides can be taken at 9:00 and 11:00 a.m., 1:30, 2:00 and 4:00 p.m. You are cordially invited to visit us.

The National Cash Register Company
Dayton, Ohio



LINCOLN STANDARD AIRCRAFT CORPORATION

AIRPLANES, PARTS AND ACCESSORIES

LINCOLN, NEBRASKA

January 7, 1925

Valentine & Co.,
Chicago, Ill.

Gentlemen:-

We have just completed a shipment of two planes to the United Fruit Co. of Tela, Honduras, which makes four planes delivered to this concern in the last year.

Aerial transportation is of vast importance to this company as the officials use the planes chiefly to transport them from Tela on the Coast to Tegucigalpa in the interior, a distance of 140 miles. This trip is made by one of our planes in from an hour and forty minutes to two hours while by any other means of transportation in that country it requires five days. It is necessary to fly at an altitude of 12,000 ft. in order to get over the mountains.

You can readily see why this company would want the most efficient and best in commercial aircraft and we have been able to supply them chiefly because we had a plane with a durable and lasting finish, which is very essential in that climate. The wood parts were varnished with Valspar to protect them from moisture and then wings and fuselage were finished with several coats of Valspar.

We have found by much experience that Valspar is the ONLY varnish that will withstand any amount of moisture and heat and still retain its lustre. We have also found that Valspar increases the life of a ship to a great extent because it preserves the covering and wood parts as no other varnish does.

Very truly yours,

LINCOLN STANDARD AIRCRAFT CORP.

Ray Page

Ray Page, Pres.

VL

The map at the right shows the 140 mile flight from Tegucigalpa to the coast. It is necessary for the plane to fly at an altitude of 12,000 feet to clear the mountains.

Valspar in the Tropics

REDUCING a five-day journey over a mountain range into a two-hour flight, is all in the day's work of the four Lincoln planes which transport officials of the United Fruit Company from the sea coast of Honduras to the interior.

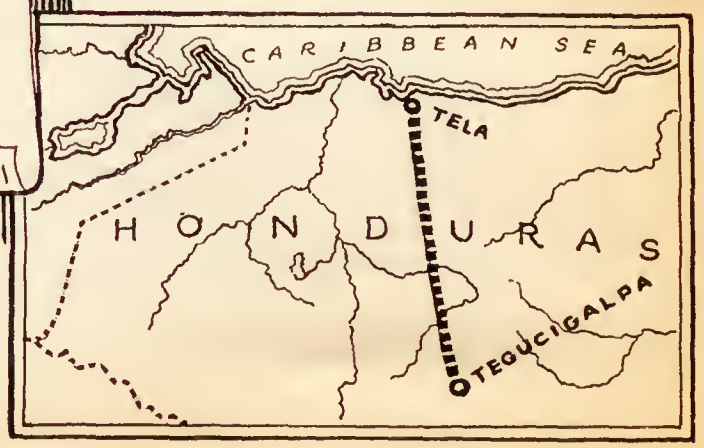
To cope successfully with the humid tropical climate of Central America, the finish of these planes must be *exceptional*—which explains why they are Valsparred.

Always, whenever a durable, accident-proof, weather-proof finish is essential, modern aircraft designers demand Valspar.

VALENTINE'S

VALSPAR

The Varnish That Won't Turn White



Slipstream

SLIPSTREAM—The stream of air driven aft by the propeller

VOL. 6 MAY No. 5

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879

SUBSCRIPTION RATES

One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL, Editor and Publisher

CONTENTS

THE DETROIT-CHICAGO FORD AIRLINE

Top: View of the "Maiden Dearborn," all-metal air pullman and transport built by the Stout Metal Airplane Company, Dearborn, Michigan and recently placed upon a regular schedule between Detroit and Chicago, under the jurisdiction and financial backing of the Ford Motor Company. The view was taken just before the start of the initial flight which carried 1000 pounds of Ford Products, mail, etc.

Top: Left to right, William B. Mayo, chief engineer of the Ford Motor Company; William "Bill" Stout head of the Stout Metal Airplane Company; Edsel Ford, Henry Ford and Pilot Hamilton holding a last conference before the take-off of the "Maiden Dearborn" on its initial flight of the Detroit-Chicago air line instituted by the Ford Interests.

Right: "Maiden Dearborn's" arrival in Chicago. Reading left to right: George B. Foster, Chicago Association of Commerce; William B. Dawes, president, Chicago Association of Commerce; Pilot Edward Hamilton, Machinist Harry Russell, former Judge Kenesaw M. Landis, J. Colvin and Major R. W. Schroeder.

The Slipstream Monthly

Published in Dayton, Ohio—"Birthplace of the Airplane"

FRED F. MARSHALL, Editor and Publisher

Vol. 6 No. 5

-:- EDITORIAL COMMENT -:-

To the Pole by Air

THAT the pioneering instinct will not be downed is manifested in the several polar expeditions which are utilizing aircraft to make the final dash over the Arctic ice-fields in quest of the northern geographical zero point. Many have been the disasters in the attempt of man to wrest this gloomy region from its throes of mystery, and although the use of aircraft in such undertakings is expected to eventually solve the problem of polar exploration, the present aerial attempts are not the first. Others have tried to reach the pole by use of the dirigible balloon and free balloon and met with disaster or failure. Using the same base at Spitzbergen in 1897, as the Norwegian and English explorers are using, three Swedish explorers, Andree, Strindberg and Fraenkel ascended in a free balloon from Virgo Haven, Danes Island, hoping that the wind currents would carry them over the pole. They never returned. Ten years later Walter Wellman, and American journalist and explorer, left the same point in a dirigible balloon, **"America,"** and was able to travel northward as far as Cloven Cliff, but was driven back in a furious storm which wrecked his ship. In 1919 Wellman made a second attempt and again suffered a failure and destruction of his balloon.

The present expeditions have much greater chances for success since they are being carried out with more attention to the ever important detail. At the latest writing radio dispatches have been received from the two Norwegian Aero Club vessels, **The Farm** and **The Hobby,** which are now located at Dane Island. It would appear from these reports that ice conditions in this region are especially favorable and that open water will permit these ships to penetrate well above 80 degrees north latitude which is approximately 600 miles from the pole. This early advance is quite favorable toward the success of the polar expedition since in former years ships could not proceed above Bear's Island, a small bit of land about half way between Norway and Spitzbergen.

ON THE WRIGHT-SMITHSONIAN WRANGLE

When a New York daily scooped the home-town papers of Dayton, Ohio, with the story that their renowned son, Orville Wright, was preparing to ship the original Wright Brothers' flying machine to the Science Museum, South Kensington, London, England, this thriving aviation center—and the whole of America for that matter again experienced the silent self-confession that these noted inventors had been grossly wronged.

Although public sentiment is now instituting a protest and various societies are endeavoring to sway Mr. Wright in his present plans to give the famous relic to a foreign museum there are few but who secretly side with him in the view he is taking against placing the machine in our own National Museum.

Mr. Wright's reasons for sending the priceless old machine to the English museum is shown in his bold statement that "America lacks a safe place for keeping the exhibit." This astonishing assertion unfolded some startling facts in connection with the treatment of the original Langley flying machine at the hands of Dr. C. D. Walcott, secretary of the Smithsonian Institute. It is claimed by Mr. Wright that the Langley plane was permitted by Dr. Walcott to be removed from the institution in 1914, radically altered and flown at Hammondsport, N. Y., "for purpose of private parties to a patent suit." The Langley machine was first brought to the institution in 1903 after it had crashed on its initial test over the Potomac river.

The assertions of Mr. Wright open an unpleasant controversy which will likely never be satisfactorily settled. Its presence and resurrection, however, is all the more regrettable in that it wrongfully implicates such worthy and notable pioneer inventors as Glenn Curtiss, Wilbur Wright and Professor Langley, himself.

The miserable failure of the Langley plane in 1903 is well known history and although as demonstrated later, the inventor of the plane was on the right track, the machine either through poor launching devices, or what-not, came to an untimely end and caused our Congress to take a skeptical attitude toward all flying machines after having alloted a sum of some $50,000 to assist Professor Langley in his developments. Completely discouraged and failing in health, Professor Langley did not attempt to re-build the plane but had it removed to the Smithsonian Institute for storage. It was later patched up and placed upon exhibition there. The Langley plane that was flown by Glenn Curtiss at Hammondsport in 1914 was admittedly much altered and strengthened. It is this plane which now hangs in the National Museum and placarded as "the first airplane capable of flight."

Although this is not wholly an untruthful statement we are led to agree with Mr. Wright that its wording savors of artful purposes of misinterpretation for those who read it and who are not in close touch with the facts. We believe, however, that opinion and regard for the accomplishments of the Wright Brothers will ultimately lead to a more direct and pointed placard for the Langley exhibit. Upon the other hand let it be said that this should be done with no intention of belittling or discarding the valuable scientific contributions of Professor Langley. Indeed it was through the application of various Langley principles, and discoveries of other flying machine builders who failed, that brought the Wrights to final success. The Wright Brothers have never failed to give proper credit to those from whom they gained their hard-earned knowledge of the air and of the flying machine.

It should be said further to the credit of such men as Glenn Curtiss that he deserves a prominent place in the annals of aeronautical achievement. The Wrights' claim that Curtiss infringed upon their patents is still a mote question as the recent controversy on the trials of the Langley plane point out, but it remained for Glenn Curtiss to advance the flying machine to points of more practical refinement. One need but review his notable record to see that the present status of the heavier-than-air flying machine owes much to his inventive genius and his ingenuity. It seems an unfortunate truth that many of our greatest personages in the history of invention have failed to "carry on," after having given to the world their first crude model conceived from years of study and research. It remains for those who come after to bring the article to a state of perfection and with a definite place in the advancement of the race. In all fairness, this was true of the Wrights. To them goes the undisputed honor of being the first to fly. To Glenn Curtiss goes a great portion of the credit for

(Continued on page 21)

A Modern Flying Carpet

By T. H. N. ADAMS, San Diego Chamber of Commerce

THOSE who saw the superb film classic, "The Thief of Bagdad," will recall with a pleasurable thrill the brilliant spectacle of The Thief and Princess soaring through the air on the Flying Carpet. It is with a similar feeling that I recount a recent experience.

Several weeks ago a regular passenger air service between San Diego and Los Angeles was inaugurated by T. Claude Ryan and B. Franklin Mahoney and, just recently, I have been a guest of the owners on one of the regular trips to the North.

Taking off from the Ryan Airport at Dutch Flats, adjoining the Point Loma Golf Club, promptly at four o'clock, the Ryan Standard four passenger cabinplane was headed due north, following the tracks of the Santa Fe. The drone of the powerful 150 h. p. Wright-Hispano-Suiza engine increased as the speed became greater, but my fellow-passenger and I soon were oblivious of anything but the magnificent vistas of mountains, land and ocean which spread themselves beneath us.

Fifteen minutes after leaving San Diego we were over picturesque Del Mar and passing Carlsbad, Oceanside, Las Flroes, San Onofre and Serra, we soon saw the quaint old Mission at San Juan Capistrano—in less than one hour since our take-off!! 90 miles an hour—and yet no sensation of hurtling through the air. We sat in a comfortable cabin—no, we were not strapped in—and beheld, at our pleasure, bird's eye views of mountains or vast stretches of the Pacific.

At Capistrano we left the coastline and headed for Los Angeles. At this point we flew for several miles at an altitude of 3,200 feet and looking out toward the Northwest commanded a splendid view of Catalina and, further north, just made out the Santa Barbara Islands, with the ships of the combined Atlantic and Pacific fleets resting at anchor in mid-distance. Laguna, Newport, Huntington Beach, Long Beach, and San Pedro were plainly in view, while inland the communities of Santa Ana, Orange and Anaheim were discernible.

Just as I was beginning to feel that we were to be a trifle behind schedule I suddenly realized that we were beginning to point toward the ground and looking ahead and below I glimpsed the landing field at 99th street and Western avenue, Los Angeles—in a few seconds we had glided to earth and had taxied to the waiting room. At four o'clock I had been in San Diego—at five-thirty I was seated in a friend's automobile and was being whisked a few blocks away to his home—in Los Angeles.

The San Diego-Los Angeles air line operates three cabinplanes, leaving San Diego daily at four P. M. and arriving at Los Angeles at five-thirty; the return trip is made leaving Los Angeles at 9 in the morning and arriving here at 10:30. Experienced, licensed pilots only are employed in the intercity air service and absolutely no stunt or fancy flying is allowed. The rates are $14.50 one way; $22.50 round trip.

TO LOS ANGELES IN 90 MINUTES!

The San Diego-Los Angeles Air Liner, one of a fleet of planes operated by T. Claude Ryan and B. Franklin Mahoney. Leaving the Ryan Air Port at San Diego the plane deposits its passengers at Los Angeles in 90 minutes. The planes use a 150 H. P. Wright engine.

AERIAL MAPPING

By LIEUT. EDWARD G. PLANK, A. S.

THE TEMPLE BILL

In the closing hours of session on March 4, 1925, the 68th Congress passed the Temple bill, providing for the completion of a topographic map of the United States within a period of twenty years, and appropriating $60,000,000 for carrying out the project. The Topographic Branch of the U. S. Geological Survey has been engaged in this class of work for more than fifty years, laboring under rather small annual appropriations, and has succeeded in producing maps at a scale of 1/62500 and 1/125000 (roughly one inch equals a mile and one inch equals two miles respectively) covering only about one-third of the area of the United States. Due to natural and man-made changes, many of the quadrangle sheets thus far prepared have become out-of-date and have been revised, and many others demand revision before they can actually be used for many of the purposes for which they were intended. The Temple Bill establishes a sound, comprehensive policy of map production which will eventually afford engineers, over the entire country, necessary facilities for solving a countless variety of problems, such as highway and railroad location, power development studies, flood control problems, etc., and will fill, to a large degree, the demand for military maps of our country.

FIGURE 1

"X-Ray" photograph showing installation of K-3 Camera and method of exposing negatives through opening in floor of airplane

IT IS certain that aerial photography will play a part of utmost importance in the compilation of the thousands of quadrangle sheets which will make up this gigantic map. The U. S. Geological Survey will desire aerial photographs over every acre of ground before surveying parties ever go into the field, and will undoubtedly have the continued whole-hearted co-operation of the U. S. Air Service in obtaining this desideratum.

THE BEGINNINGS OF AERIAL MAPPING

The application of photography to the science of map-making is by no means a new idea. Fifty years ago experiments were conducted in taking photographs from captive balloons and kites; these first tests were followed by many other slightly different schemes, none of which, however, proved to be practicable. Panoramic camers have been used on the ground for the past fifteen years to obtain photographs for mapping, but their use is restricted to localities of great relief. The perfection of the airplane, expedited by the necessity for aerial observation, attack, and bombardment during the World War, made available a thoroughly practical and reliable method of obtaining the point of view so long desired by those men interested in photogrammetry. Experimental work on airplanes and photographic equipment has resulted in a steady development, until now such a high state of efficiency has been reached that airplanes and photographic equipment can be relied upon to function properly in operations conducted from temporary as well as from per-

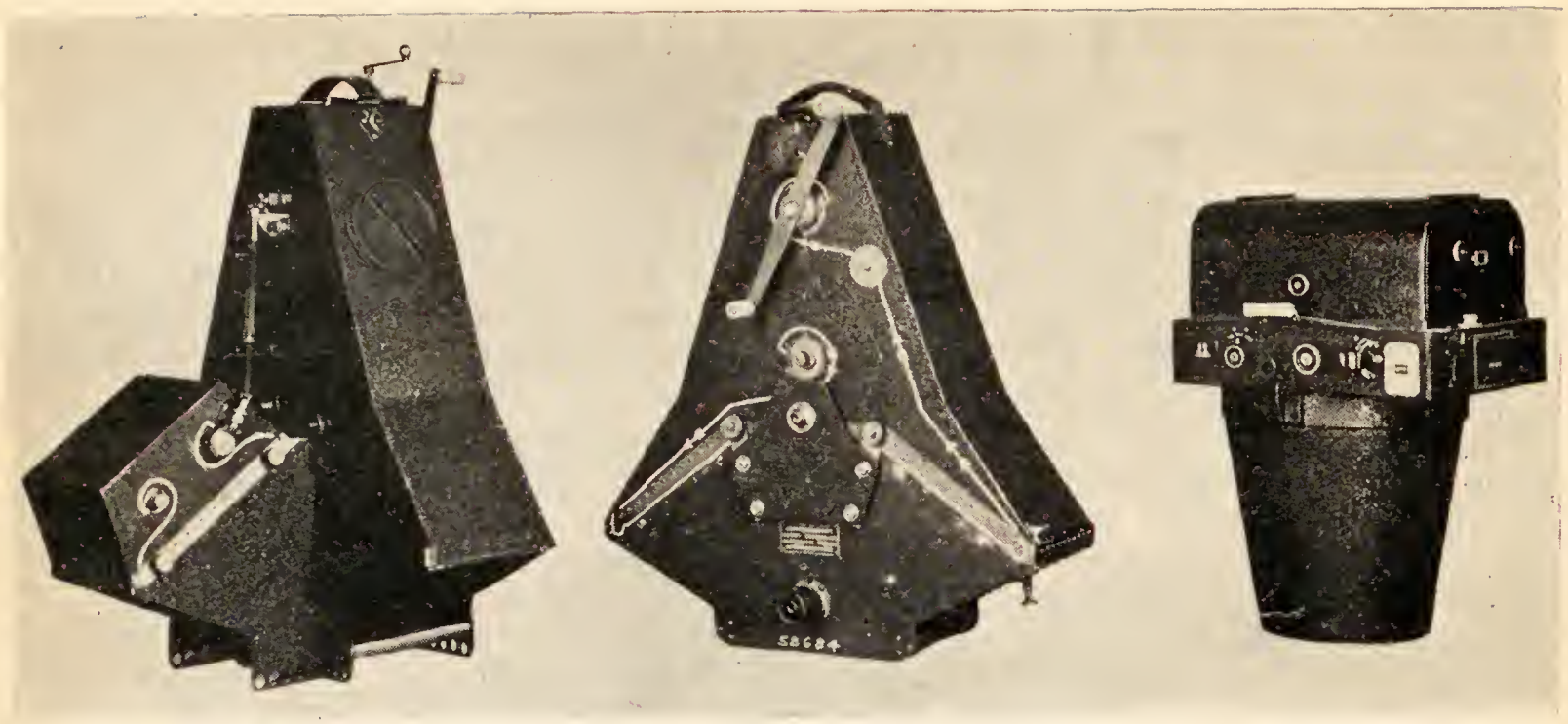


FIGURE 2

A. S. Types K-3, T-1 and T-2 Cameras, showing relative sizes of these types. The T-2 Camera is 26½ inches high.

manent bases.

CHARACTERISTICS OF AERIAL PHOTOGRAPHS

Practically all aerial photographs intended for use in preparing mosaics or maps are so-called "verticals," i, e., photographs exposed with the optical axis of the aircraft camera lens approximately vertical. If it were possible to obtain a photograph under the ideal condition, namely, that the photograph be taken with no tilt of the camera over a truly plane parcel of ground and with no such errors as lens distortion, negative shrinkage, paper shrinkage, etc., such a photograph would be a map in the sense that it is a true orthographic projection of a portion of the earth's surface. But such conditions are purely theoretical. Every effort is made to have the optical axis of the camera lens truly vertical at the instant of exposure; this condition is judged usually from spirit level bubbles mounted on the cameras and sometimes from gyroscopes. However, neither the bubbles nor the gyroscope gives mathematically correct indications due to the fact that an airplane is continually deviating from a straight and level, constant-speed flights, setting up accelerations which affect materially either spirit levels or gyroscopes. The result is that practically all "verticals" have some tilt, difficult to determine in amount and direction. It is, therefore, not safe to scale distances directly from aerial photographs because the latter, in general, have no uniform scale. Another great source of error in verticals lies in the fact that images of points are displaced in or out along radial lines drawn from the center, due to the relief of the terrain. Other material sources of error in verticals lie in lens distortion, shrinkage of the negatives, and shrinkage of the photographic paper. Obviously, a vertical cannot express the true relations of the points it shows due to these inherent errors, which, although they are usually small, may sometimes reach amazingly large proportions.

MAPPING CAMERAS

THE cameras now used as part of the standard equipment of the U. S. Army Air Service are the A. S. Types K-3, T-1 and T-2. The K-3 camera has a single lens of 12" focal length with a between-the-lens shutter, and a demountable and interchangeable magazine with a capacity of 120 exposures on a roll of film 9"x75'; the camera may be operated automatically or manually. With this camera, a standard quadrangle, about 225 square miles in a latitude of 40 degrees, may be covered at a scale of 1/5000 in about seven hours actual flying. This camera has its application for mosaic-making and for mapping where a large scale and fine detail are desired.

The T-1 camera, frequently called the Bagley camera, is a tri-lens camera with two side lenses of 7½" tilted 35 degrees to the right and left of the center lens of 6½" focal length, all equipped with between-the-lens shutters arranged to trip simultaneously; it gives one hundred and ninety exposures on a roll of film 6"x380'. Belonging to each camera is a T-1 Transforming Printer, so adjusted that the two oblique negatives from the side chambers may be projected to equivalent verticals and joined to contract prints from the center negative to form a composite vertical. The T-2 is a four-lens camera, having an additional chamber, exactly like the side chambers, so arranged that it covers the area to the rear of the line of

flight; a typical T-2 photograph, suitable for mapping, is shown in Figure 3, this being an exposure from 13000′ altitude under average conditions. The width covered by this photograph is 7 1-3 miles. The T-1 cameras are used almost exclusively for mapping. A quadrangle of 225 square miles can be covered with either camera at a scale of 1/15000 in less than two hours actual flying.

Figure 2 shows the A. S. Types K-3, T-1, and T-2 cameras in their correct relative sizes.

INSTALLATION OF CAMERA IN PHOTOGRAPHIC SHIP

The rear cockpit of the Air Service photographic airplane is designed to allow the ready installation of any type of aircraft camera. Each camera has its own mount, carrying four sponge rubber pads which rest upon four clamps rigidly attached to two transverse cross-arms; this method of suspension allows rotation of the camera about a vertical axis through its lens. This rotation, known as "crab," is essential to compensate for the "crab" of the airplane due to drift in cross winds, and allows the observer to obtain the proper relation between consecutive photographs of a strip. A view-finder is mounted for convenient use in the rear of the cockpit; it consists of a lens with a ground glass at the focal distance, the glass being properly ruled to show roughly the drift of the airplane and 40% of the distance in the direction of flight covered by a particular camera. The complete installation is shown diagrammatically in Figure 1 in which the side of the fuselage has been uncovered to show the camera in its mount, the view-finder, and the manner in which photographs are taken through an opening in the floor of the ship.

PHOTOGRAPHIC FLIGHT

Before a photographis flight, the work to be done is thoroughly discussed by the pilot and observer and co-ordination established, for, once they are in the air, it is impossible to converse without throttling, the motor or resorting to written notes, either of which has obvious disadvantages. The courses over which it is desired to fly are drawn in parallel lines upon maps of suitable scale, and are carefully selected with reference to such landmarks as highways, railroads, towns, rivers, ranges of hills, etc., in order to simplify the task of the pilot. These courses are usually laid to allow for a 50% overlap of the photographs laterally—a none too generous margin to safeguard against leaving gaps—and the photographs are exposed with a 60% overlap in the direction of flight, a

FIGURE 3

Composite T-2 Photograph, exposed from 13,000 ft. altitude and giving a width of seven and one-third miles. Total area covered by photograph is 21.3 square miles.

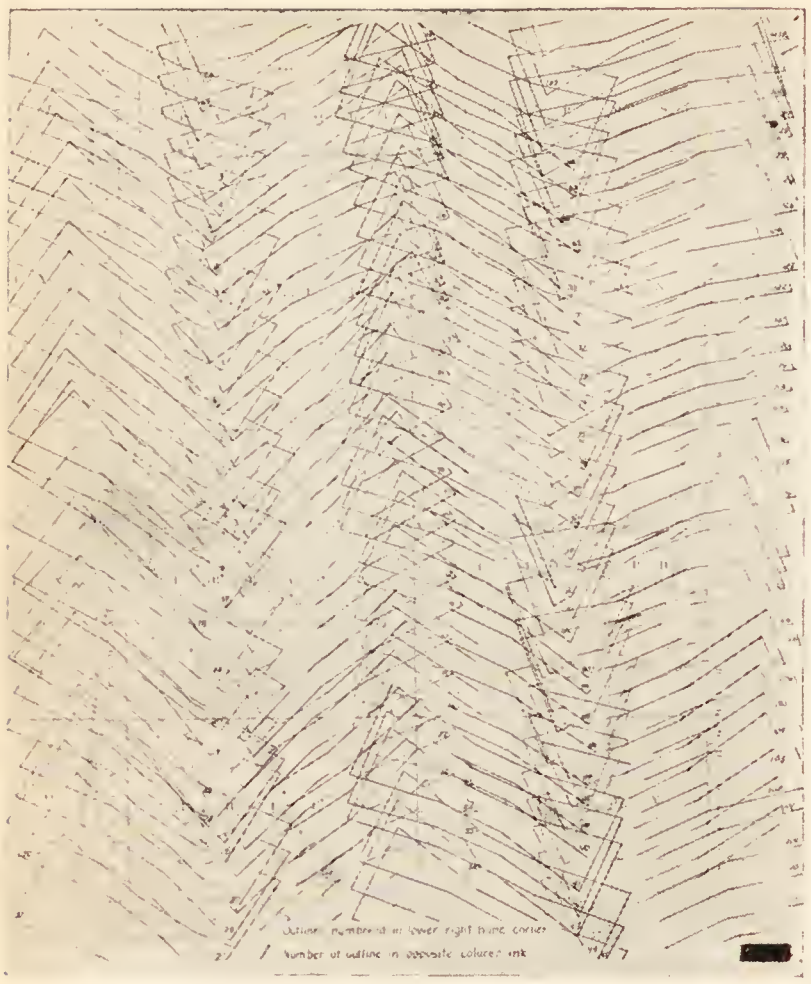


FIGURE 4

Index map of a well photographed area showing typical amount of overlap of photographs.

necessity imposed by the method of using the photographs for map-making. This affords the further advantage of furnishing stereoscopic pairs of photographs over the entire area.

Having developed and numbered the negatives and obtained prints from them, (processes which differ from analogous commercial work in no essential respect) an index map is plotted showing the exact area embraced by each photograph. This shows at once any unphotographed areas or gaps that may exist, and, if there be any, they are filled in by an additional flight. Figure 4 shows an index map of the Urbana quadrangle, State of Illinois, illustrating a typical method of covering such an area.

DESCRIPTION OF MOSAICS

The use to which the photographs will be put depends largely upon the nature of the engineering problem involved. The quickest and simplest method of compiling the photographs is to assemble them into a mosaic by merely matching them according to topography of overlapping areas; there will be in this case no positive scale for the mosaic and any measurements made upon it must be regarded as approximate. Figure 5 illustrates such a mosaic. A "controlled mosaic" may be made up by plotting to scale primary control for the area, and causing the photographs of these control points to fall at their correct relative positions. Figure 6 illustrates this class of mosaic. More exact mosaic, the so-called "photographic maps," are prepared by restoring each photograph to the scale of the control by reducing or enlarging in a special restitutional printer, and assembling them according to the plotted positions of control points. This is the most refined form of the mosaic, but it is even now not a map for the reason that it does not show the true relative position of points other than control points except under the exceptional circumstances of the restitutional work being extremely accurate and of the mosaic being photographed over ground of practically no relief.

FIGURE 5

A rough mosaic, illustrating how separate photographs are joined. This shows moderately rugged country along the Tennessee River in the vicinity of Guntersville, Alabama.

METHOD OF USING AERIAL PHOTOGRAPHS IN MAP-MAKING

PHOTOGRAPHS used in the produciton of conventional line-drawn maps are taken with an overlap of 60% in the direction of flight; a row of points may then be selected which will appear in three successive photographs, i. e., they will fall at the leading edge of one photograph, at the center of the next, and at the trailing edge of the next. Lines are drawn on such photographs as shown on Figure 3. It may be demonstrated mathematically that all important errors in the locations of images of points on "verticals" lie along lines radiating from points very near the center of the photographs, and that only an inappreciable error is made in assuming that these lines radiate from the principal point or geometrical center of the photograph.

The necessary primary control points obtained by standard methods of ground survey-

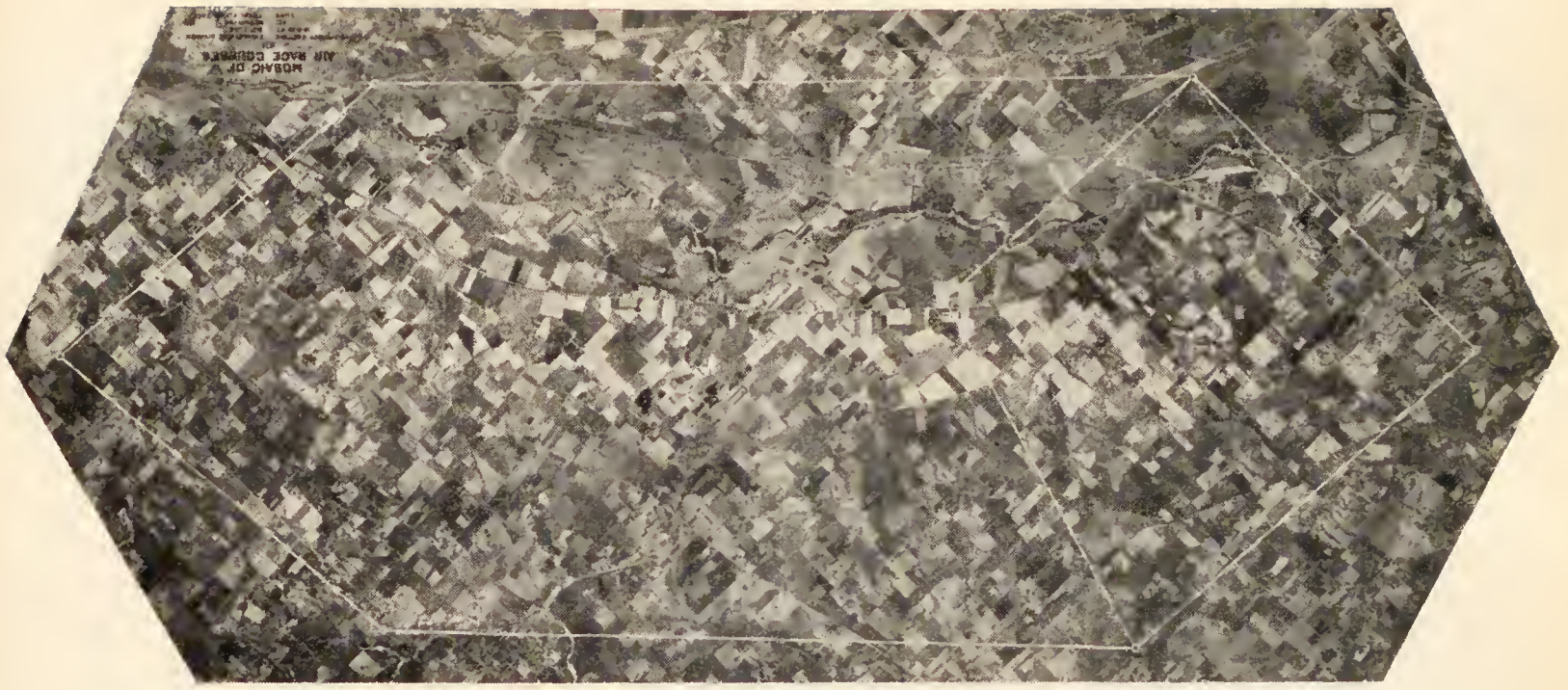


FIGURE 6

A controlled mosaic upon which is a lay-out of the 1924 International Air Race Course. 437 photographs were used in assembling this mosaic which covers 94 square miles.

ing, are plotted at the scale of the map upon highly transparent tracing cloth or upon celluloid. These primary control points are identified upon the first photograph; radial lines are drawn to them and to another row of points which appear also on the second photograph. These primary control points must be so disposed on the first photograph that radial lines drawn through them make good inter-sections at the center of the photograph, for the same principles apply in map-making from aerial photographs as apply in resection work with a plane-table. The tracing cloth upon which the primary control has been plotted is now placed over the first photograph, and the photograph and tracing cloth are oriented with respect to each other by causing the plotted positions of the control points on the tracing to fall along the radial lines to these points on the photograph. The center of the first photograph is now plotted and all radial lines are traced upon the transparent cloth. The second photograph (which shows the primary control points, and overlaps the first photographs by 60%) is now oriented underneath the tracing cloth in the manner described above; its center is plotted and all radial lines are traced upon the transparent cloth, some of these lines being to the secondary points used in the first photograph and others to new points which will appear in the third. Since the radial line drawn to any secondary point, m, gives the true direction to that point, and since the direction to the point, m, is given by radial lines from the centers of two consecutive photographs, the true location of the point must be at their intersection. (This is analogous to the location of points in ground surveying by intersection from the two extremities of a known base, the base in this case being the line connecting the plotted centers to two consecutive photographs.) The third photograph is now oriented underneath the tracing cloth, and gives a third direction line to the point, m, and serves to check its location. These secondary points are now used as the control points for orienting the third photograph. This process is carried on until the entire strip of photographs has been used and a tie-in has been made of radial line intersection and gives a resultant accuracy commensurate with good plane-table work on the ground.

The planimetric data are now transferred to the tracing cloth by pantograph, during which process it is necessary to adjust all data to their correct relative positions as determined by the location of the secondary control points. Contours are obtained by one of two methods, both involving field work: one scheme used successfully is to contour directly upon the aerial photograph, using it as a plane-table sheet and transferring the contours to the tracing cloth simultaneously with the transfer of the planimetric data; the second is to prepare lithographed, line-drawn plane-table sheets after the planimetric data have been transferred to the tracing cloth, and using the sheets thus prepared as plane-table sheets. The remaining steps of assembling the work into proper form and of reproduction are standard methods.

The preparation of maps as just described gives a saving in cost ranging from 20 to 45 percent and a saving in time so tremendous that its value in certain cases passes belief. There is also a marked and important increase in the accuracy with which the cultural data, stream meanders, drainage systems, etc, are recorded.

USES OF AERIAL MAPS AND MOSAICS

The practical uses for which aerial maps and mosaic are especially adapted from the military, governmental, and commercial standpoint are numerous and varied. They are peculiarly adaptable to the preliminary reconnaissance and final location for power transmission lines, where a strip of photographs may be obtained over a possible route from such altitudes that the land-owners know nothing of the proposed development. And because no one need go upon the ground until the legal details of purchasing right-of-way are to be closed, the uncanny rise in value of the ground is avoided. All possibility that any essential features have been omitted from the map is entirely eliminated,

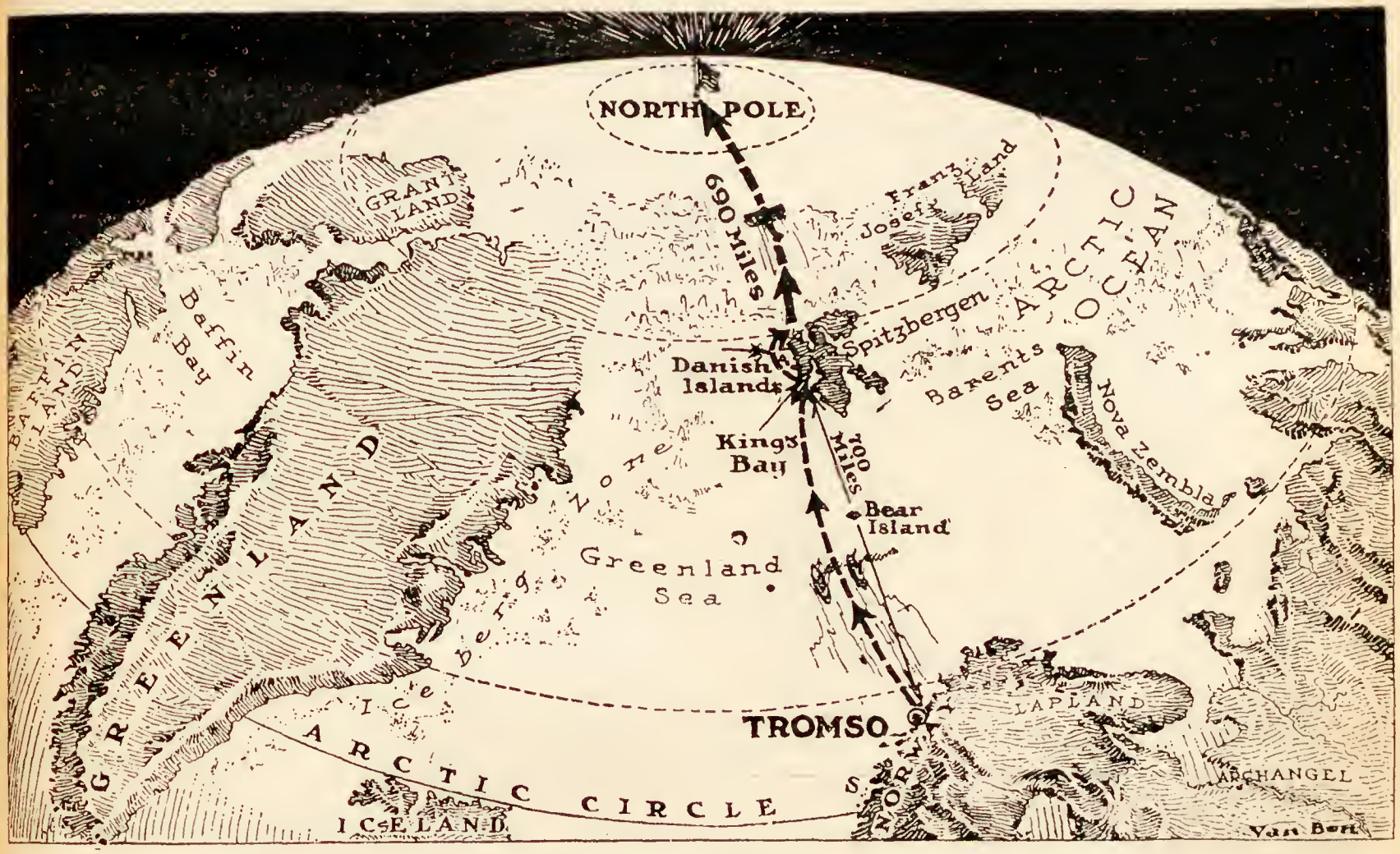
(Continued on page 21)

THE NUNGESSER AMPHIBIAN

The two pilots shown in the circular view to the left are, Pilot Russell Simpson (right), Howard Sheaff (left), representative of the Cox-Klemin Aircraft Corporation which manufactured the novel Amphibian plane shown in the view below. This popular new ship was designed by the famous French "Ace" Captain Charles Nungesser.

The Nungesser Amphibian, known as the N. U. A. type is powered by a special 135 H. P. rotary engine. It is designed to carry two passengers and a pilot at top speed of 100 miles per hour and at a normal cruising speed of 73 miles per hour. It has a standard amphibian retractable landing gear and a wooden hull. The wing span is 40 feet, length from bow to rudder 30 feet, total wing area 450 square feet. The new Nungesser Amphibian will be marketed by John H. Stelling, well-known American representative of the Voisin automobile. It is reported that 100 of the planes have been ordered from the Cox-Klemin firm, with a schedule of ten planes per week, starting May 1. That a man of Mr. Stelling's influence and station should take such an active interest in this new ship is a good indication of its exceptional merit.

"The North Pole Trophy Race"



Map showing route to be followed by Amundsen in his attempt to reach the North Pole, the last lap between Danes Island and the polar point being made in flying boats. Open water reported above Danes Island points favorably toward a successful flight.

AN "International Air Race," of an entirely different nature than any heretofore associated with this term is is now well under way. In this daring race, which may have either disaster on the barren Arctic wastes or a vast new region of untold natural wealth, as a prize, the United States will compete with England and Norway, the latter a nation of traditional prowess in exploration, and the names of whose fearless navigators adorn the pages of history and furnish the heroic figures for many chronicles of weird fable.

THE AMERICAN EXPEDITION

The American polar project will be known as the MacMillan Arctic Expedition with U. S. Naval pilots and Loening amphibian airplanes participating, under the supervision of Donald MacMillan, famous polar explorer who has made nine missions into the polar regions, in quest of scientific data and objects of exploration.

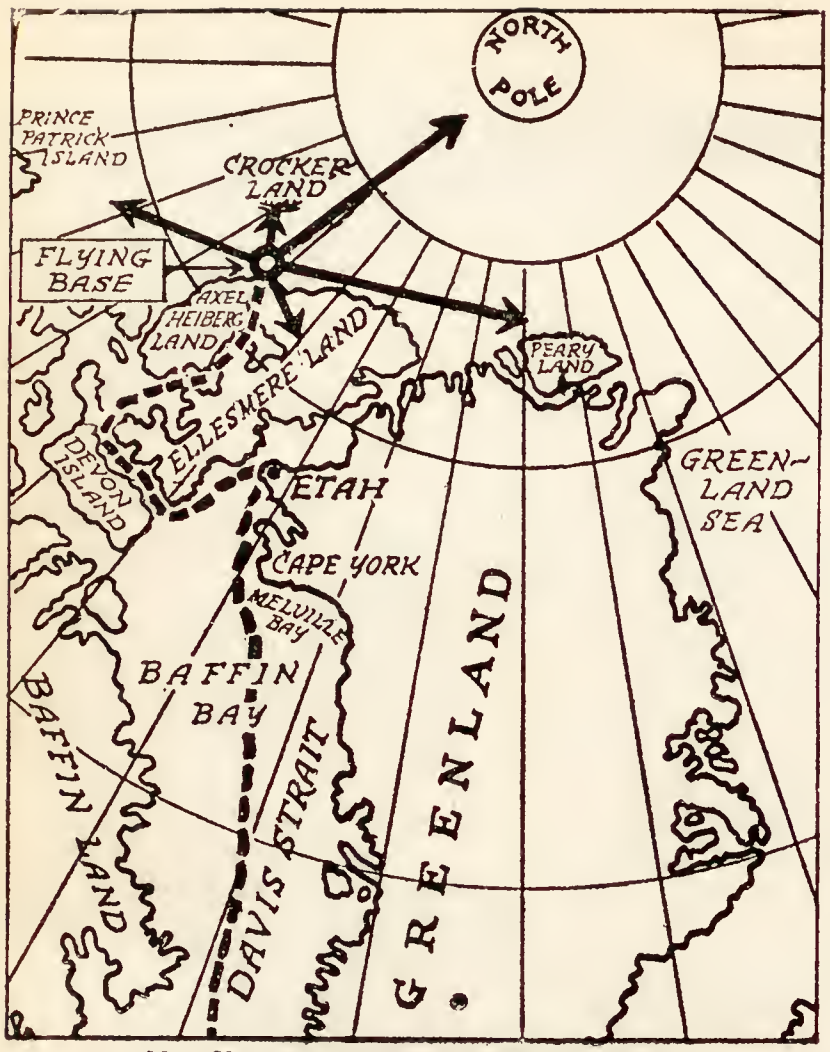
The Norwegian expedition will be sponsered by the Norwegian Aero Club under the supervision of the veteran explorer, Captain Roald Amundsen.

There will be two planes assigned by the Navy Department to the American expedition. Lieutenant Commander R. E. Byrd was selected from more than twenty applicants to take charge of flying operations in connection with the unusual polar project, while two other Naval pilots, Lieutenant (Junior Grade) M. A. Schur, and Chief Boatswain Earle E. Reber will accompany the expedition as pilots.

Lieutenant Schur will be definitely assigned as engineering officer of the flight division and will have particular cognizance over engineering supplies and spare parts for the planes. Chief Boatswain Reber has been assigned as assembly and construction officer of the flight detail and is now at the Philadelphia Navy Yard assemblying material for the expedition.

Lieutenant Byrd in addition to general supervision of aviation preparation for the expedition is giving particular attention to the aerial navigation features. Lieutenant Byrd was assigned to this phase of preparation for the trans-Atlantic flight in 1919.

The MacMlilan Expedition will start northward on June 15 from Wiscasset, Maine, skirting the Labrador Coast, thence across Davis Strait to the shores of Greenland—the same route supposedly followed by "Leif the Lucky," "Eric the Red" and the ancient Norsemen who discovered the North American continent many years before the time of Columbus. The ruins left on the bleak shores of Labrador and Greenland by these ancient



Map Showing Route to be Followed by the MacMillan Polar Expedition

Norse roamers will be studied and explored by the expedition.

From this point the sturdy ocean convoy vessels will proceed into the Arctic seas via Baffin Bay to the settlement of Etah situated at the ice-clogged narrows between this point and Ellemere Land. If conditions permit the vessels to proceed further, a course skirting about Ellemere Land will be followed through Smith Sound to Kennedy Channel from which position all further operations in the effort to reach the pole by air will be based. Using Axel Heiburg Land as an advance station for the Amphibian planes, flying expeditions will be made over the great stretch of unknown region which has for time immemorial spurned the efforts of mankind to claim it from its frigid fastness.

Crocker Land will be the first objective and if the planes are successful, this point which is now an uncertain domain will be definitely established on future maps of the region. Admiral Peary is our principal authority in favor of its existance which he estimated as being about 120 miles from Axel Heiburg Land, but MacMillan upon a former expedition failed to find such a place after traveling over 150 miles in the approximate direction. The use of the Loening airplanes will make it possible to explore miles of this territory in a few hours that would otherwise require weeks of hazardous "mushing" by dog sled. The planes will also make it possible to maintain a connection with the supply ship which will be located several hundred miles from the advance air base. The Loening planes are able to land and take off on, water, ice, snow or land.

Striking approximately eastward from Axel Heiburg Land the airmen will explore the area about "Peary Land" or Cape Columbia, where Admiral Peary established his northernmost outpost in his dash for the Pole. At this point the explorer is supposed to have left some very important records, copies of which the aviators expect to discover. The planes will also explore westward in the direction of Prince Patrick Island. Photographs and complete data of the findings in this vast unknown territory will be secured. Three types of cameras will be carried, including a mapping camera and cameras for taking both still and moving pictures. It is expected to secure accurate surveys of various uncertain regions including Baffin Land about the Magnetic pole which the leader of the expedition expects will develop highly important scientific features with reference to magnetic phenomena.

Radio equipment assembled especially by the Radio Broadcasters League and operating on 20, 40, 80 and 180 meters will be carried and keep the explorers in communication with the outside world.

THE NORWEGIAN EXPEDITION

At Danes Island the Norwegian Expedition headed by the world famed explorer, Amundsen, is ready to proceed to the Pole with their two flying boats. Convoyed by a special exploring vessel, "The Farm," it is hoped by the explorer to find, as the season advances, open water between Danes Island and the great field of pack ice. If this proves true the convoy will be able to carry the planes 50 to 75 miles further north from the original base, with take-offs being made direct from the open water space in the ice field.

It is thought that the approach to the pole by way of Spitzbergen is of special advantage due both to the favorable wind currents which are mostly north and south, and because it is one of the points where the magnetic compass is still of service well within the artic regions. The Magnetic Pole, lying in Boothia Land gives the needle good directive force, with the variations easily checked. Once at the pole, however, and with all directions pointing south the novice wonders how the explorers will be able to calculate the right direction back home. At this point the sun remains in the same position on the horizon throughout the 24 hours of the day and it is feared that some clever heads will be needed to make accurate calculation in the fast traveling planes.

"Air-raft," for use by Navy fliers with the MacMillan Arctic Expedition, is tried out by Lieut. Cmdr. R. E. Byrd, U. S. N., at the Naval Air Station, at Anacostia, D. C., on April 27, 1925.

The "air-raft" is collapsible, and can be carried in a small pack, easily portable. The weight of the device is ten pounds and one of them will be carried in each airplane used by the Arctic explorers. Lieut. Cmdr. R. M. Byrd, who will be in charge of the Naval unit with the MacMillan expedition tried out the device on the Potomac River on April 27. A seaplane of the Naval Air Station, Anacostia, was used. Lieut. Comdr. Byrd carried the "air-raft" with him in the plane on a flight, and after the plane had landed he inflated his light-weight life boat with a pair of bellows carried for the purpose, while still in the plane, placed the device in the water and got in it and rowed to shore with the greatest facility.

The Americans will be aided somewhat in their unusual navigation problems around the polar areas by the use of the Byrd sextant and the sun compass. The former instrument was developed by Lieutenant Byrd and used on the 1919 trans-Atlantic voyage of Naval airplanes. It uses a bubble to supply an artificial horizon line and will be used to take sights of the sun at various altitudes independent of the existence of a natural horizon. The sun compass will make use of the twenty-four hour sunlight phenomena using the instrument after the general principle of a sun-dial, the shadow thrown by the sun indicating the cardinal points of the compass at the various hours of the day.

Amundsen will use two Dornier metal flying boats in his polar dash which will require a non-stop flight of about 1400 miles in case conditions will not permit of a landing after departing from the base in the vicinity of Danes Island.

THE BRITISH EXPEDITION

Grettir Algarsson of Vancouver, according to the "London Daily Mail" will use an airship—now being built by Messrs C. G. Spencer & Son of Highbury, in an attempt to fly to the North Pole in May.

The young British Columbian who hopes to beat the American and Norwegian explorers to the pole is using a small blimp type airship. The explorer left Falmouth for Liverpool on April 12 where his exploration ship "Iceland" will be completely fitted out.

Algarsson has as his chief assistant Commander Frank Arthur Worsley who was with Shackleton expeditions as sailing master. Another Shackleton attache,—W. J. Marr will accompany Algarsson as assistatnt biologist, representing the University of Liverpool.

Flight Lieutenant Humphrey Humphries will pilot the blimp on its polar dash.

Using a similar route to Spitzbergen, Algarsson will push as far north from this point as possible with the "Iceland", and with himself and the pilot make the last dash by air to the pole in the airship.

WRIGHT "CYCLONE" AN IMPROVEMENT

The largest air-cooled airplane engine that has been produced in this country was flown from Paterson, N. J., to Washington, D. C., in a Navy torpedo plane on Wednesday, April 29. The two hundred and thirty miles covered by the flight was made in what is considered to be remarkably fast time for a heavy duty plane. Lieutenant Lee Webb of the Bureau of Aeronautics, Navy Department, who piloted the plane, landed at that Naval Air Station in Washington one hour and fifty minutes after leaving Paterson.

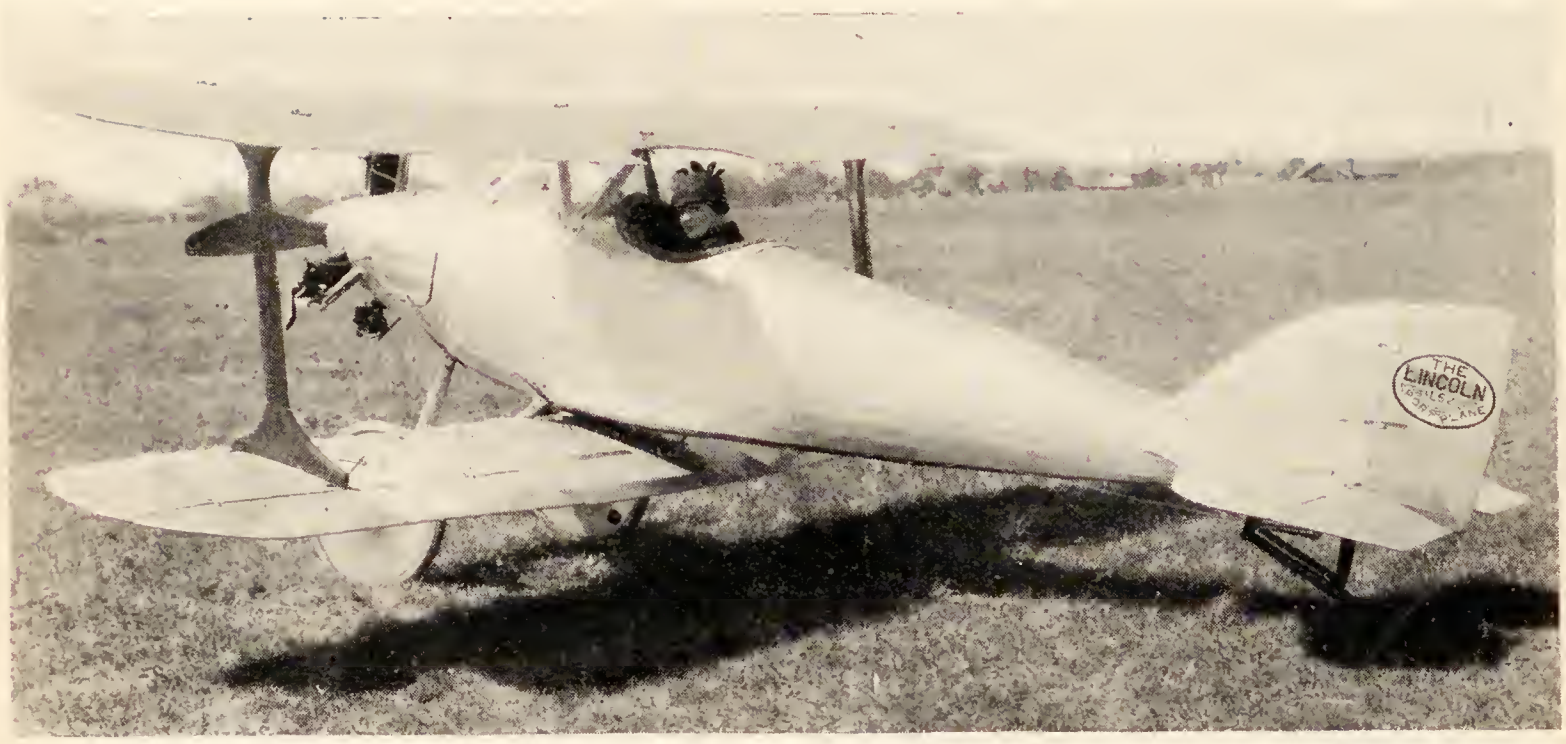
The engine installed in the plane is the first of its type to be built for the Navy by the Wright Aeronautical Corporation. It is a 450 horsepower motor and has been named the "Cyclone."

Tests of the plane with the new air-cooled motor have indicated a marked increase in efficiency and performance. This fact is attributed to the decrease in weight per horsepower through the development of the air-cooled principle. The advantages of the air-cooled motor have been recognized for several years in aeronautical circles but the practical difficulties in building power plants in units of relatively large horsepower has hitherto proved a considerable difficulty. A comparison with the Liberty motor gives an accurate impression of the advance that has been made in the air-cooled "Cyclone." Whereas the Liberty installation involves a weight of 3.2 pounds per horsepower when ready for flight the new Wright "Cyclone" cuts this weight factor to 2 pounds per horsepower, a saving in weight of nearly forty per cent. Other advantages for the air-cooled engine in military types of aircraft are found in the elimination of the water cooling system which involves considerable head resistance and renders the plane more vulnerable to enemy attack. A puncture of the radiator system in combat will effectually eliminate a plane from action and bring it down.

In tests at the Paterson plant of the Wright Company the plane indicated superior performance characteristics. It climbed for altitude at the rate of 1000 feet per minute, took off with a very short run in eight seconds and landed under control with a greatly reduced landing speed.

The importance of weight saving in aircraft motors is illustrated by the fact that the improved engines make available an enormous reserve of power in light planes such as fighters. This gives the fighting plane the advantages of ability to climb rapidly in altitude and maneuver under this reserve of power.

The Lincoln Sport Plane



This trim little sport plane built by the Lincoln Standard Aircraft Corportion of Lincoln Nebraska, is powered by a 30-HP Anzani motor and in recent tests carried the diminutive ship over 100 miles per hour. This job is priced at $1495.00 complete or the parts may be purchased from the company for your own building at $147.00 (less motor, cloth and instruments, but including blue prints).

THERE are many features infused in this little job and by the removal of seven bolts the plane may be dismantled and ready for crating or storage in less than 30 minutes. The entire tail unit is of welded steel tubing construction. The stabilizer is of symmetrical camber and detachable, while the rudder and fin are built into the fuselage so that there is a small fin exposed on the underside to which is attached the tail skid, this also being of steel and resting on the usual shock absorber cord. The undercarriage is of steel tube construction with through axle. The struts are streamlined with balsa wood. 20x4 wheels are used. Width of axle is 4½ ft. **Wings**—The webs of the ribs are Bass wood with the usual lightening holes, capstrips are of spruce. Spars are of the routed I beam sections also of spruce and spliced in the center so that they are continuous spars through the whole span of the wing with a dihedral of 4 deg., both planes are built in one continuous panel from tip to tip.

The upper plane has a cut-away at the center over the cockpit and is fastened to the center N struts with four bolts. The lower plane, which is single panel, is fastened to the underside of fuselage with three bolts. The ailerons are on the lower plane only, and aileron control wires run within the lower wing. The single I-struts on each side of interplane bracing are of built-up spruce laminations. Landing wires are single, flying wires are double, all are 3/32 in. cable.

Fuselage—The fuselage is of the girder type built of spruce, the longerons being of ash forward of cockpit. The cockpit has plenty of leg room for such a small machine. The rear end of fuselage lined with basswood false work. The cowling is of 20 ga. aluminum. A three hour duration gas tank is located between fuselage and cowling just over the center of gravity. Engine is separated from the fuselage with an aluminum wall.

Dimensions—
Span both wing, 20 ft.
Chord both wings, 34 in.
Gap between wings, 40 in.
Stagger, 15 in.
Length over all, 16 ft.
Height over all, 5 ft. 7 in.

Wings—
Wing curve, U. S. A. 27.
Total wing area, 108 sq. ft.
Angle of incidence, top wing, 1½ deg.
Angle of incidence, bottom wing 0 deg.
Decalage, 1½ deg.
Dihedral both wings, 4 deg.

Tail Unit—
Stabilizer area, 7½ sq. ft.
Elevator area, 5½ sq. ft.
Fin area, 3 sq. ft.
Rudder area, 3 sq. ft.
Aileron area, each 6 sq. ft.

Weights—
Weights empty, 370 lbs.
Weight loaded, full load, 600 lbs.
Wing loading, 5½ lb. per sq. ft.
Power loading, 17 lbs. per HP.

Power Plant—
Anzani 3 cyl. 30-35 HP.
Propeller, 6 ft. dia., 5½ ft. pitch.
Propeller speed 1,500 rpm.
Oil capacity 5 qts.
Gas capacity 6 gal.

Performance With Full Load—
Maximum speed, 90 m. p. h.
Cruising speed, 75 m. p. h.
Minimum speed, 35 m. p. h.
Range, 250 miles.
Climb, 800 ft. per minute.
Miles per gal. of fuel, 35.
Factor of safety throughout 11.

Finish—
The plane is covered with Grade A linen, 5 coats of new Titanine nitrate dope and finished with Valspar varnish.

Recent Developments in Aero Engines

AS everyone knows the future progress of aviation hinges particularly upon the development and improvement of the aero engine. Bearing this point in mind it is particularly interesting to note in our comparison of the various nations as regards aeronautical status that American Engine builders are conspicuously in the lead. Airplane Engines conceived by American designers and manufactured by American firms have established service ratings ranking highest in the list of existing types.

The more notable American engine building firms are: Curtis Aeroplane & Motor Co., Inc., Wright Aeronautical Corporation, and Packard Motor Car Company, although various other firms have been identified more or less with experimental work in this field.

During the last year the three firms mentioned have been particularly in the limelight with the production of several new types which are heralded as master pieces in their field.

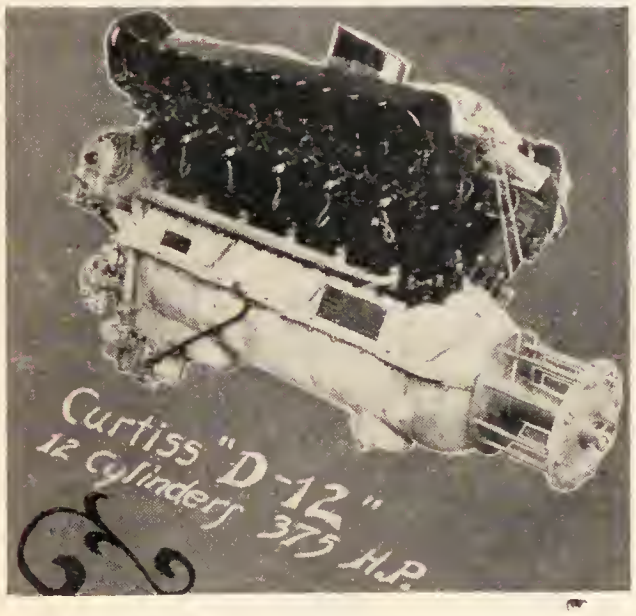


Fig. 1—The Curtiss D-12, 375 HP Motor. This engine is used extensively in both the Boeing and Curtiss Pursuit planes.

The Packard Company recently brought out in the 600-800 horsepower field the 1A-2500 which is considered an outstanding development of the year. It was the engine picked by the Navy for the experimental Boeing Patrol ship which is fitted with Allison reduction gears of 2 to 1 ratio. Coupled with its features of high power and smooth running is the extreme light weight per horsepower. It is one of the very lightest weight engines known for the given power.

Another Packard triumph is the 1A-1500 engine in the 400-500 horsepower field, and which is now being put into the air for service test.

In a recent test of the Navy's new Torpedo seaplane which is fitted with two Packard 1A-1500 engines, a 50-minute cruise at a speed of 128 miles per hour was performed, carrying a capacity load of nearly nine tons. This engine which is rated at 500 horsepower developed 550 horsepower at 2,400 r.p.m., according to the report of the designers, Col. J. G. Vincent and L. M. Woolson. The power of the two engines was transmitted successfully through the Allison gear of 2 to 1 ratio and is therefore regarded as a pioneer feature.

For the 300-400 horsepower variety the old reliable Curtiss D-12 seems to have no equal. Smooth-running, powerful and rugged it is

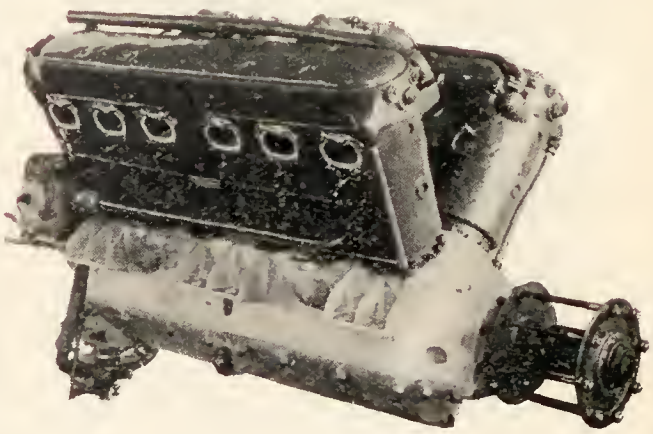


Fig. 2—The Wright "Tornado" (T-3), 600-675 HP Motor which has made several world records for endurance, when equipped on Naval planes.

regarded by military authorities as in a class by itself. Both the Curtiss and Boeing Pursuit planes used by the Army Air Service are equipped with D-12's and have withstood to a remarkable degree the high rotative speeds required in pursuit maneuvers.

The Wright Aeronautical Corporation has brought out recently a number of remarkable engines and this firm is rapidly coming to the fore as a world leader in engine building. In the 500-600 horsepower field the Wright "Tornado" (T-3) is considered the best. It was originally intended for a 500 horsepower rating but makes 600 horsepower easily. It is this engine which established the world endurance record for seaplanes with the Navy CS-2 and SDW-1. It also carried the Naval PN-7-1 and PN-7-2 to a number of records at the Naval Air Pagent at Bayshore Park near Baltimore in October, 1924.

THE first PN-7 equipped with "Tornados" stayed in the air for 55 hours without overhaul. In the winter maneuvers of the fleet new engines were installed and established the phenominal record of 279 hours and flying approximately 25,000 miles without overhaul. An examination of one of

these engines after this grueling test showed that it was in excellent condition. Only one piston ring had an excessive clearance and the fuel pump a broken gear bushing. The main pump, water pump, carburetor, magnetos, camshafts, rocker arms and cam rollers were otherwise in perfect condition.

Among the more promising types in the experimental variety Wright engines are likewise conspicuous. Under Naval supervision

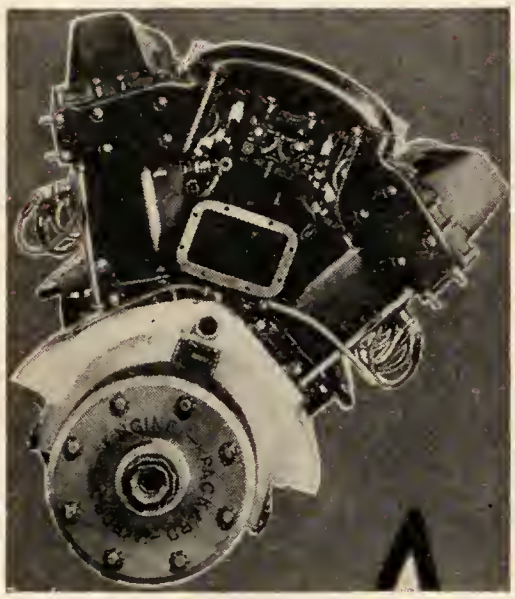


Fig. 3—The new Packard 1A-1500, 12-cylinder, 500 HP Motor, several of which are being tested on Naval Torpedo planes and the Army Observation Planes, now in production.

the Wright Radial "Cyclone" (P-1) has completed tests with fine success. This engine was originally started by the Lawrance Aero Engine Corporation but with the consolidation of this firm with Wright the work on the "Cyclone" was continued and completed by Mr. George Mead, Wright Engineer of international prominence in engine design. Mr. Mead is greatly responsible for the Wright's triumph in engine building.

The "Cyclone" has 1650 cubic inch displacement, about 200 cubic inches greater than the Curtiss Radial type.

The purpose of the Air-cooled "Cyclone" was to possibly replace the Liberty in certain types of ships, principally the Naval torpedo and observation planes. This, of course, necessitated an air-cooled powerplant of larger displacement than had been constructed in this country before.

The "Cyclone" is a fixed radial with nine cylinders having a six-inch bore and 6½ inch stroke. The displacement is the same as the Liberty. The external appearance of the Wright "Cyclone" is remarkably clean with the very noticeable feature of a valve gear with valves located in the plane of the crankshaft instead of at right angles to the crankshaft, and with the exhaust valve forward and the inlet valve to the rear. The operation of the exhause valve is orthodox by means of a push rod and rocker arm, but the inlet valve is operated by a pull rod across the top of the cylinder. The valve gear is located in front of the engine, and all the accessories at the rear, including carburetors, magnetos, pumps, strainers, etc.

THE Wright Firm has also to its credit, the Wright "Whirlwind," (J-4) 200 horsepower, air-cooled engine, the Wright "Tempest" (E-4) 200 horsepower water-cooled engine and the Wright "Gale" (L-4) 60 horsepower air-cooled engine.

The Curtiss experimental 400 horsepower, air-cooled R-1454 has great promise as shown by a very remarkable 50-hour test on the basis of its weight, power and smoothness of running. In co-ordination with the Army Air Service the Curtiss Aeroplane & Motor Company, Inc., will no doubt realize great success with this engine.

At McCook Field experimenting on the Almen barrel-type engine and the Cam engine is still in progress while the Navy expect to bring out something new in a heavy oil engine for use in rigid airships.

So long as America can claim such designers as Mead, Woolson, Nutt, Chilton and Noble this country need not worry about her future position in aeronautics so far as excellence and reliability in engines is concerned. It is hoped upon the other hand that our Government will furnish the incentive for these men to give the best that is in them in their important work. The future of aviation rests particularly with these engine men backed by the fine organizations which claim them.

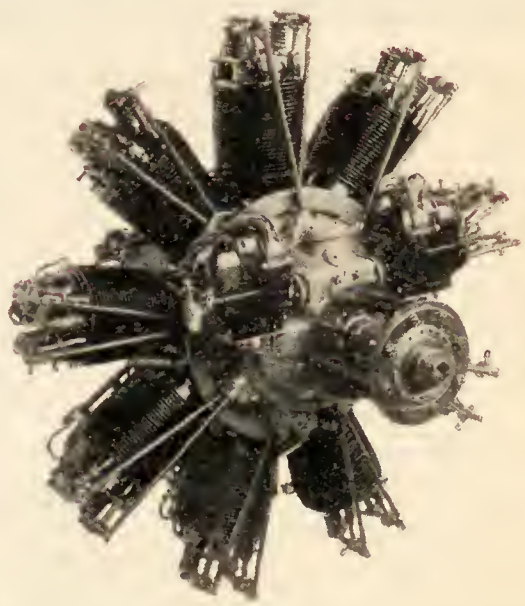


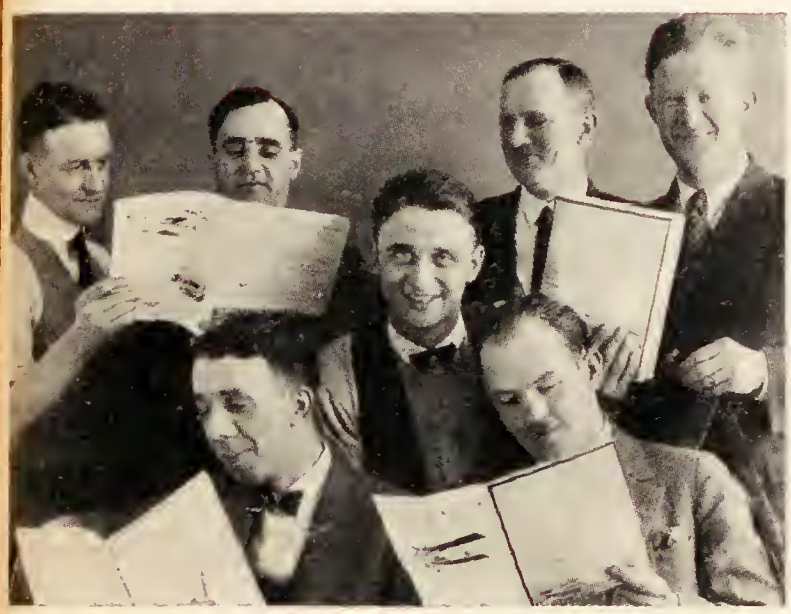
Fig. 4—The Wright "Whirlwind," J-4, 200 HP, air-cooled Motor.

(Continued from page 7)

demonstrating to the public the practical developments possible in the airplane.

Reverting to the unhappy question of the removal of the Wright plane to England, the American people should feel that the blame for its loss lies with them.

For more than a decade it has been stored away in the little work shop of Orville Wright, in Dayton, no more than a stone's throw from the earlier shop where over twenty-one years ago the two Wright boys, Orville and Wilbur, repaired bicycles and tinkered on their crude gliders and powered flying machine which was destined to bring them fame and fortune and furnish as one of the most valuable contributions to the human race since history began. Dayton, the city where the machine was conceived, too, might have owned it and quite fittingly erected a suitable edifice for its preservation. But Dayton is typically American and does not think of such things until it is too late. Now Dayton, "The Birthplace of the Airplane," must watch meekly the object to which she has directed so much pride, pass out of her gates forever.—F. F. M.



"SLIPSTREAM" BRINGS POPULAR FAVOR IN DETROIT

The accompanying photo showing a group of aeronautical enthusiasts from the staff of the Detroit Free Press reading the current issues of Slipstream Monthly.

Reading from left to right, those in the photograph are (top row), Bob Carr, chief artist; Don McIntosh, foreman press room; J. S. Haney, circulation manager Slipstream Monthly; Charles Planck, aviation editor. (Center figure), Russ Kimble, photographer. (Bottom row), Charles Franklin, Franklin Motor Car Company, Syracuse, N. Y.; George Hopkins "Hoppy," President of The Detroit Flying Club.

(Continued from page 14)

an advantage indeed over the older methods under which even the most diligent topographers frequently omitted some important feature.

In a somewhat similar manner, reconnaissance surveys for rairoads and highways may be thoroughly studied from aerial maps or mosaics. Because it is possible to identify and differentiate the various types of coniferous and deciduous trees on aerial photographs of even a small scale, and to determine the number of trees per acre, the use of aerial photography in timber cruising has become widespread. The fact that large areas can be covered in a remarkably short time with no possibility of overlooking even the most minute details gives aerial photography a wide application in obtaining data for traffic control problems and crop acreage determination. Studies relating to power development and flood control projects, and to city planning and zoning, are peculiarly well served by aerial maps.

SPECIAL NOTICE!

To the many readers who have been greatly interested in the LIGHT PLANE articles by Ivan Driggs, which have appeared serially in Slipstream Monthly since the December, 1924, issue, we are glad to announce that in our June issue the author of these articles will furnish complete lay-out drawings and specifications for a Light Plane.

Incidentally, it happens that a considerable number of typographical errors occurred throughout the story prepared by Mr. Driggs, and which were due to the rushed condition of our print shop and lack of proper facilities for setting mathematical equasion characters. This handicap has been remedied and we trust there will be no such serious faults in the future. Such errors are embarrassing to the author, exasperating to the editor and confusing to the reader. However, in this instance there is nothing we can do but make a careful re-check of the Light Plane serial as a whole and submit corrections to the errors in the text. We offer these corrections here, or otherwise invite you to direct an inquiry to the National Advisory Committee for Aeronautics, Washington, D. C., which organization has lately published a Technical Bulletin, using the text of this article with corrections.

CORRECTIONS

JANUARY ISSUE, Page 33, second column, second paragraph—character V should read: Vmp becomes 40.1 miles per hour. Page 34, formula (8) should read: $D = 564 \sqrt[3]{\frac{P\,m}{N\,Vo^2}}$

APRIL ISSUE, Page 16, Formula (7), should read: $Aw = \frac{W}{Kymax} (V\ min)^2$

Formula (11) should read: $Af = \frac{.015\ Sw\ Aw}{L\,n}$

Formula (12) should read: $Ap = \frac{.03\ Sw\ Aw}{L\,h}$

Under the section, **"POWER PLANT WEIGHT," B. Propeller,** Formula should read: $W\ prop = .04D^3$

On page 17, under Section VI, **BODY GROUP, A. Fuselage,** paragraph should read: "The only data available on a single seater is that of the DJ-1 where the complete fuselage weighs 30 lbs., the fuselage of a two seater will weigh approximately twice as much."

The equasion in the same section should read:
"Let Wf = Weight of fuselage covered in lbs.
Wp = Weight of powerplant (see 1)
Wu = Weight of useful load—III plus IV, plus V.
Wf = .10 (Wp + Wu)"

Page 18, second column, first paragraph should read: "A line at right angles to the wing chord through the center of gravity should intersect the wing at a point from 28 to 30 percent back from the leading edge."

1925 U. S. AIR RACE EVENTS

The Jacques Schneider Trophy Race is scheduled for October 23-24, at Baltimore. Entries for this contest which closed April 1, lists the following participants: United States, 3 planes (U. S. Navy); Great Britian, 2 planes; Italy, 2 planes.

This contest marks the eighth international Schneider Cup Race and was cancelled last year, due to failure of foreign entries to take part after they had made entry.

The Curtiss Marine Trophy Race is still awaiting a definite decision as to location although it is very likely the event will be staged at San Diego, although the Peekskill-on-the-Hudson Chapter of the N. A. A. wants the seaplane speed event held as a feature of the Bear Mountain Bridge Celebration in June. A thirty-day postponement of a decision as to a definite location of the classic has been made by the Contest Committee, N. A. A., to favor the Air Service Reserve Officers Club of Los Angeles who is also making a bid for the race.

The Pulitzer Speed Trophy Race will be held sometime between September 17 and October 3 at New York City with no foreign planes entered in any of the events scheduled. The entries which closed April 1 showed that the United States would enter three planes, representing the Army and Navy, two of which will be of Curtiss design and manufacture. The New York location was decided upon at a special meeting of the Contest Committee at St. Joseph, Mo., after considerable controversy was ironed out in connection with the availability of a desirable speed course in the vicinity of New York City.

The National Championship Balloon Race was held at St. Joseph, Mo., May 1. The contest was first inaugurated in 1919 to select an American team to participate in the International Gordon Bennett Balloon Races. This year's contest was won by W. T. Van Orman, with C. K. Wollam, piloting the Goodyear III. The veteran pilot landed the bag at Reform, Alabama.

The following tabulation gives official positions and distances made by the contestants in the National Elimination Balloon Race, starting from St. Joseph:

Position	Pilot	Landing Place	State	County	Distance
1	W. G. Van Orman	Reform	Alabama	Pickens	585 mi.
2	Lt. Wm. J. Flood	18 mi. south Batesville	Arkansas	Independence	342 mi.
3	H. E. Honeywell	1 mi. west of Aberdeen	Mississippi	Monroe	543 mi.
4	Herbert Von Thaden				
5	Herbert Von Thaden	3 miles N. E. Selma	Kansas	Anderson	110 mi.
	Major Maurice Smtih Non-contestant Pilot Balloon	Crenshaw	Mississippi	Panola	450 mi.

Due to high winds prior to the start of the Race, one of the Army Air Service balloons to have been piloted by Captain R. E. O'Neill with Lieutenant Guy Oatman as aide, came to grief during inflation and it was necessary to deflate the balloon with the result that only one Air Service entry started.

In view of the bad weather conditions, H. E. Honeywell and Herbert Von Thaden objected to inflating their balloons during the official inflation period. The pilots were repeatedly warned by Major A. B. Lambert, the official Referee appointed by the Contest Committee of the National Aeronautic Association, that they were subject to disqualification. It was finally decided after Major Lambert had been in conference with the St. Joseph Contest Committee, Sunday night, May 2d, to demote H. E. Honeywell and although Honeywell made greater distance than Lt. Herbert Von Thaden one position with the result that William Flood he will be placed in third position, moving Lt. Flood up to second position and placing Herbert Von Thaden in fifth place in so far as prize money is concerned.

Arrangements are now being made for the three winners, Van Orman, Flood and Honeywell to go to Brussels, Belgium, at once as Amercia's team in the first contest for the Second Gordon-Bennett Cup. This contest will be held at Brussels, Belgium, on June 7. It is rumored that Captain R. E. O'Neill will be sent over by the Air Service as an alternate pilot.

SPEED WITH SAFETY

CURTISS CARRIER PIGEON

THE Air Mail Division of the United States Post Office Department is the greatest exponent of commercial aviation in the world. Having successfully proved over an operating period of eight months that a day and night schedule between New York and San Francisco was feasible and practical, the next step was to obtain aeroplanes that, with the same faithful Liberty motors and with the same or better performance, would double the pay load—thus doubling the income without materially increasing the operating costs. The Curtiss Aeroplane and Motor Company, Inc., were quick to see the opportunity and developed for the Air Mail Service, the Curtiss Carrier Pigeon.

On the official tests this machine made the following remarkable performance with full fuel load and a pay load of one-half a ton, twice that of the present DH.

High speed 128 MPH **Landing speed 50 MPH**
Cruising speed at 1500 RPM 108 MPH
Ceiling 16,200 ft.
Climb 1,000 ft. per minute to 3,000 ft.

The official cross-country flight of one hundred miles was made in fifty-nine and one-half minutes on twenty gallons of gasoline.

Five miles per gallon — Five cents per mile — Ten cents per ton mile.

This is Commercial Aviation with Real Economic Possibilities.

Curtiss Aeroplane & Motor Company, Inc.

Garden City, N. Y.

Introducing

The 3-Place OX-5 "Canary"

A Better Airplane Built for Commercial Purposes!

A Better Airplane and Why!

Built to Aeronautical Safety Code factors.

Steel construction throughout except Wings.

Comfortable Passenger Compartment with ample Doors for entrance and exit.

Wide-Split Axle Landing Gear and stearable Tail-Skid insuring better controlability on the ground.

30-Gallon gravity feed Fuel System.

The quick getaway, exceptional performance and wonderful maneuverability as shown in recent tests prove that "The Canary" IS a better airplane.

We will extend the utmost courtesy and consideration to those seriously interested. Call or write for complete descriptive data.

JOHNSON AIRPLANE & SUPPLY CO.

DAYTON, OHIO., U. S. A.

N ABOVE ALL W E S
BETTER AIRPLANES
JOHNSON
DAYTON OHIO

Jun 1926

SLIPSTREAM

DEVOTED TO AVIATION

The Commercial Flyers' Magazine

DAYTON
the NATION'S AIR CENTER

HASENSTAB DAYTON — OHIO

$2.00 PER YEAR

25¢ PER COPY

The Douglas Company

Santa Monica

California

When this Ship Takes-Off--

When the Pilot of the O-2 type Douglas Army Observation plane, pictured above, hops in for a flight it is with the assurance of a safe take-off and landing, for like the 'Round-the-World Planes (Douglas designed), this type is also equiped with Dayton Wire Wheels, streamlined to cut down wind resistance.

The expert pilot, safe in the air, is at the mercy of his landing gear when landing. That's why Dayton Wire Wheels are so largely used by government fields and airplane manufacturers; they do not crush.

SPECIFICATIONS OF DOUGLAS O-2

(when powered by Liberty Engine)

Two-Seater Observation, Liberty 400 h. p. engine; Maximum Speed 137.2 m. p. h. at ground and a service ceiling of 16,900 ft.; Gas Capacity 170 gallons, sufficient for a cruising range of 950 miles. Tests made with full military load of 1615 lbs.

Located at Dayton, Ohio, the birthplace of the airplane and the home of McCook Field, our Engineers have been closely co-operating for years with flying fields and airplane designers all over the world in developing the highest type wheels for aircraft.

"For the Man who Drives or the Man who Flies"

The Dayton Wire Wheel Company
Dayton, Ohio

Dayton Wire Wheels
QUICK DETACHABLE

Slipstream

SLIPSTREAM—The stream of air driven aft by the propeller

VOL. 6 JUNE No. 6

PUBLISHED BY THE SLIPSTREAM PUBLISHING COMPANY

401 Beckel Bldg., Dayton, Ohio

Entered as second-class matter August 20, 1923, at the Post Office at Dayton, Ohio, under the Act of March 3, 1879

SUBSCRIPTION RATES

One Year, U. S., $2.00; Canada, $2.25; Foreign, $3.00. Postage Prepaid.

FRED F. MARSHALL, Editor and Publisher

CONTENTS

The Slipstream Monthly

Published in Dayton, Ohio—"Birthplace of the Airplane"

Vol. 6 No. 6

-:- EDITORIAL COMMENT -:-

Aviation's Greatest Year

THE year 1925 seems destined to be the turning point or "crisis" in the status of aircraft both as an instrument of war and a practical mode of transportation in civil affairs.

Several things have contributed to this condition which now seems to herald a gradual but healthy expansion of commercial air travel and the serious attention of military heads to the menace of air invasion.

Of all the specific advantages gained from the American World Flight there remains the general good influence on public opinion which had drifted into a state of utter indifference with respect to aviation in any sense. Led to watch the progress of the World Flyers first as a matter of novelty the public became more and more seriously concerned with the attempt as tales of the super-human efforts of these aviators to see the thing through to success came through as they pushed ahead from the ice-bound Arctic to burning desert sands almost in the course of a day's flight.

These boys were going to succeed in making a flight around the world!—a marvelous thing indeed. And later, when two of the original four planes which started on the 27,000-mile journey landing at the starting point, neither the occupants nor the planes looking much the worse for wear the spectators marveled all the more. There was a tendency all along the line for people to get a real "close-up" of these "World Cruisers," to see what they were made of and what made them fly. Even our President was so impressed, that he stood in the rain several hours waiting for the famous craft to land where he could get a good close-up squint at them for his own personal information. It goes without saying that President Coolidge was moved by what he saw.

No sooner did he get back to the White House than he sent for his new Secretary of the Navy to come to Washington at once for a private consultation.

So the World Flight directed the spot light of public interest on the airplane. People knew that what once had been done can be done again. Business interests began to presage the possibility of national and "international" air commerce while military authorities mused over the fact that "if peaceful air missions across the ocean are possible what would the drastic measures of war-times bring to pass?"

Thus the year, 1924, although one of the darkest years for the Aeronautical Industry in general, ended with public opinion greatly bolstered up in interest for aeronautical development and impatient for a "show-down" in both the commercial and military phases. The climax in the commercial trend of thought came with the successful trans-Atlantic voyage of the ZR-3, German built Zeppelin. When this huge airship dipped its nose in solemn salute to the early risers of Manhattan after crossing the storm-strewn Atlantic the world (and America particularly) was ready to admit that the age of air travel had arrived. Then came a series of fatal air crashes climaxed by an unusually bad accident on the London-Paris air line when eight persons were plunged to a horrible death. This came as a sort of challenge in the face of spectacular successes in air travel. Would public confidence revert to an attitude of uncertainty regarding the safety of air transports? The answer came with the continued patronage on all European air lines and the willingness of the public to appreciate the findings of the committee which investigated the crash as one which could have been averted and of the kind not apt to occur often enough to be considered a hazard. For the first time the world admitted that air travel was here to stay and that it could be regarded as "safe" in the face of reverses.

Other loaded transports lifted from the Croydon airdrome before the charred wreckage of the ill-fated DeHaviland was cleared away, and convinced us that the modern traveller could learn to view an air crash in the same light as a train wreck or an auto fatality. Human progress carried the day.

We next turn to the General Mitchell wrangle as the consequence of an investigation of our Air Program by a Select Congressional Committee. Testifying as a witness, General Mitchell, who for several years had held the position of Assistant Chief of the Army Air Service, called a spade a spade at the cost of his rank and the salvation of our country. Today "Colonel" William Mitchell stands as the most utterly wronged personage in America. To sum down the actual result of his somewhat "tactless" but nevertheless truthful explanation of conditions in our air program we might say that he is the modern savior of his country. So long as wars are possible they are bound to happen. Certainly then, there is no greater crime than to wish upon our children another such experience of unpreparedness as was ours in the Great War. "Trust in God and keep your powder dry," is a mighty good dose to feed the narrow-minded pacifist.

General Mitchell was not demoted so much for what he told before the select committee, but rather his disregard for military traditions which are fostered in the same vein as our antiquated coastal defenses and by those very officials who can never be made to see these new perils in warfare, until they are subjected to them in actual combat as was General Mitchell. It will remain for the younger generation to exterminate the "coal-burner" admirals and other "spur-heeled" military heads who have made it necessary for such as General Mitchell to FORCE the truth of the airplane's military value on the public mind. General Mitchell virtually scared the people of America by his lambasts on the condition of our Air Forces.

As a result of General Mitchell's virulent attack, the Navy Department is quietly but surely going into the serious study of aeronautics. The recent launching of the **Saratoga**, U. S. Navy airplane carrier will no doubt mark a precedent in the history of warship construction.

In the Army Air Service a large contract for the new Observation planes to replace the obsolescent "DH's" is significant item in the general outlook for a formidable air army, in the course of a few years.

Returning to the Commercial phase, the expansion of the Air Mail Service with contract bids to be let in July to private enterprises for conducting these Mail routes is of prime importance. There is a sum of $2,600,000 available for the maintenance of the Air Mail Service for the next fiscal year. A good portion of this will be allotted for purchasing planes among U. S. manufacturers.

The experiments of the Ford interests in Commercial air lines are bound to furnish some valuable and convincing data, while the more recent inauguration of a $10,000,000 corporation to start an air transport line between New York and Chicago may be pointed out as an absolute assurance that America will within the next two years show the way in Commercial Aviation. Foreign nations, no doubt, will soon be made to see the folly in the subsidy plan and

revert to our own methods of healthy, normal growth.

Thus, the year 1925 bids fair to be a most important one, and let us hope a profitable one for all of us who have been sweating blood awaiting this happy period of better times.—F. F. M.

Wright First Plane May Remain In U. S.

Grover Loening of the Loening Aeronautical Engineering Corporation, New York City has been spending some time in Dayton of recent months during the special testing of the New Loening Amphibian plane. During a more recent visit Mr. Loening called on Mr. Orville Wright with a view to ironing out the differences between Mr. Wright and Dr. Walcott which have arisen as a result of a controversy on the proper exhibition of the Langley and Wright flying machines.

Mr. Wright's announcement that the original Wright Brothers machine which flew successfully at Kitty Hawk in 1903 would be sent to the Science Museum, South Kensington, London, England caused a furor of derision, especially when the famous Dayton inventor pointed out his reasons for giving the great relic to a foreign museum. As most everyone knows by the various newspaper comment Mr. Wright has pretty well established his claim that the Langley machine now on exhibition at the Smithsonian Institute is not the "original" Langley "Airdrome" which failed to fly twice at the testing grounds over the Potomac River in 1903. After extensive and vital alterations it was made to fly in 1914 at Hammondsport, N. Y. After this latter test it was returned to the Smithsonian Museum and placarded as follows "Original Langley Flying Machine; the first man-carrying aeroplane in the history of the world capable of sustained free flight; invented, built, and tested over the Potomac River by Samuel Pierpont Langley in 1903. Successfully flown at Hammondsport, N. Y., June 2, 1914."

No one has found a very good argument against Mr. Wright's claim that he did not consider the Smithsonian Institute a "safe" place for his famous machine and since there were no other Museums of National importance where the machine could be properly displayed in this country he had found it necessary to send it to the London Science Museum where it would receive proper care and exhibition among the other notable aeronautical trophies on display there.

The purpose of Mr. Loening's visit was to gain a possible understanding between Dr. Walcott and Mr. Wright which would result in the Wright machine being retained here at the Smithsonian Institute.

It is known that Mr. Loening's mission was not entirely futile and that Mr. Wright does not mean to assume an attitude of stubborn indifference to any motives of arbitration on the part of influential friends.

Mr. Wright assured Mr. Loening that he would not be obstinate in the matter of shipping the famous flying machine to England. His word having been given he feels pledged to the officials of the foreign institution to make the delivery. Any deviation or revision of these plans must of course be brought about by outside influence. This would seem quite an easy matter insomuch as the English are traditionally square in such matters and would no doubt release Mr. Wright from his pledge once the circumstances were made clear.

It then remains for Dr. Walcott to agree to a new placard being placed on the Langley exhibit as submitted by an unprejudiced "board," which action would no doubt bring back the smile of Orville Wright and lift a load which he has borne silently for the last ten years. We believe this action would make a new man of Orville Wright and inspire him to greater enthusiasm for taking part in the work of furthering aviation.

The Morehouse Motor

Elsewhere in this issue will be found photos and data on the new Morehouse Light Plane motor designed and built by Harold E. Morehouse, civilian engine expert connected with the Power Plant Section, Engineering Division, Army Air Service, McCook Field.

Light plane builders of the United States have been watching with considerable interest the development of this light engine, there being a sad lack of suitable light plane engines available in this country aside from the ordinary motorcycle variety.

Sometime ago Mr. Morehouse built a smaller engine after this type and turned it over to a manufacturing concern for production. The result was that this company concluded, after some preparation, that the demand was not of such quantity as to warrant the production program being carried out. Consequently this motor has never been available on the market. We believe, however, that recently the Army Air Service let bids for five of these motors to several manufacturing concerns and bids ranging from $6000 to $1500 per motor were received. This contract although still pending, may likely never be placed, especially since Mr. Morehouse has now developed a more powerful motor with only about 30-lbs. addition weight.

Contemplating a similar experience with his latest product, should he place it in the hands of an outside manufacturer for production, Mr. Morehouse has decided to handle the work himself.

At present parts are available but for three complete motors which will not likely be placed on sale. The first test motor is now being installed in the light monoplane built by Mr. Roche, McCook Field designer who is actively associated with Mr. Morehouse in the development of the new engine.

Mr. Morehouse is to be highly commended for his painstaking efforts in the face of handicapped conditions. All work on this project was carried on by him "after working hours," and with money earned by himself in daily wages. It is therefore all the more to his credit that the motor reveals such fine possibilities.

For the present Mr. Morehouse is not in a position, either financially or from a practical standpoint to enter into an extravagant advertising campaign, of the kind urged so persistently by a certain eastern aero weekly magazine publisher. What he needs most now is the whole-hearted support of the trade journals whose business it should be to assist Mr. Morehouse in getting into production of his motor at which time he can judiciously make expenditures for advertising. The editor of Slipstream feels that this new motor will fill a serious need in the light plane field and requests all those who are interested in a near future purchase to direct their inquiries to Mr. Morehouse at 39 Gebhart Street, Dayton, Ohio. The price of $595.00 for the motor as previously announced is not a definite one and will stand for a reasonable reduction should any considerable number of orders be received.

Clement Ader

The recent death of Clement Ader at Toulouse, France, at the age of 84 brings to light another tragic story in the attempt of man to conquer the mystery of flight in the "pre-Wright" period. It might also recall another claimant to that honor of the first to fly in a heavier-than-air machine.

Ader was an engineer in the French Government Department and first took a great interest in the study of flight of birds. His first attempts in practical aeronautics was enacted in the construction of man-carrying kites. In 1890 he attempted to build an airplane known as the "Eole." There is a con-

tested claim that this machine flew a few feet, before being wrecked in the test.

A second machine was then built with the help of Government funds. This machine also came to grief in the first tests. A third machine—the famous "Avion" was then completed. This was a monoplane with bat-like wings, twin propellers powered by a steam engine.

On October 1, 1897, Ader piloted the machine before a delegation of French Military officials. It is said the machine skipped along close to the surface of the ground and by noting the tracks of the undercarriage wheels it was asserted that a free flight of some 300 meters was made. Unfortunately the landing brought disaster to the machine. The authorities were not sufficiently impressed with the flight and refused to grant funds for further testing and Ader disheartened and lacking in funds abandoned his flying machine experiments.

An inquest was held in 1914 to determine definitely if the Ader machine had flown but nothing much came of the findings. However, the French have recognized Ader's pioneer work and have adopted the term of "Avion" as the official designation of all heavier-than-air craft used for military purposes. A rather belated honor was bestowed upon Ader in 1924 when he was permitted to wear the red rosette of the Legion d' Honneur.

DISTINGUISHED VISITORS AT DAYTON POSTS

Robert Noorduyn with Anthony Fokker were visitors to Dayton recently and calls were made both at McCook Field and Johnson Airplane & Supply Company at which latter place a new Commercial Air Line has been inaugurated between Dayton and Cincinnati.

Mr. Noorduyn has turned over to the Editor of **Slipstream** some interesting photos of the new Fokker F-VII cabin ship which featured in the recent "stalling" tests held at Croydon, London airdrome, on April 15. We hope to publish these photos with data from Mr. Noorduyn in a later issue.

"WORLD'S MODEL FACTORY" USES AIR MAIL

The National Cash Register Company of this city has booked its first orders through the use of the air mail. A few days ago a salesman for the Company in Cheyenne, Wyo., wanted some help from the Sales Promotion Department in closing two orders. He sent his request to the office of The National Cash Register Company by airplane mail. In two days he had the help he wanted and had closed two sales, sending the orders by Air mail so they would be included in the May business record. The aerial service enabled the Sales Promotion Department to furnish the necessary information sought by the salesman and to get it back in time to hold the customer's interest.

GOODRICH COMPANY ACTIVE IN AERO INDUSTRY

As a matter of information to various persons who have made inquiries to the office of **Slipstream Monthly** as to the correct manner of addressing The B. F. Goodrich Company and Goodyear Tire & Rubber Company of Akron, on aeronautical matters we publish the following:

A. G. Maranville was recently appointed Sales Engineer for the Aeronautical Sales Division of the B. F. Goodrich Rubber Company. W. C. Young is at the head of the Aeronautical Department of the Goodyear Tire & Rubber Company.

At the present time the B. F. Goodrich firm is in the production of Airplane tires, radiator hose, airship and balloon valves, lace-on-type windshields for airplane tires and leak proof tank covers.

Goodyear is making similar aviation equipment, while a subsidiary—The Goodyear-Zeppelin Corporation is experimenting on advance types of airships.

We trust that mail directed to the above parties will be given better attention than if sent through the general channels of mail going to the firms.

DENVER FIRM INAUGURATES AERIAL SALES FORCE

Word is received from Don Alexander, president of the Alexander Film Company, Denver, Colorado, makers of publicity motion pictures announcing that the firm is going into the production of airplanes and is establishing a flying sales force. The company's initial plane—a Swallow, known as the "Progress" has lately finished a tour in the central states on a sales promotion mission. On this trip the ship was piloted by J. A. McInaney, assistant sales manager of the company. The company has already written a number of orders for planes through their salesmen.

Mr. Alexander had previously written **Slipstream** for various information concerning commercial flying and we are glad to note that the firm is making this very commendable move.

FORD'S AIRLINE GOING STRONG

In the period since the Detroit-Chicago line was started and up to June 1, 18,000 miles have been flown and 75,000 lbs. of company freight and express have been carried between the two stations.

Thirty-three round trips have been made with only two forced landings, neither of which resulted in any mishap. One landing was made to escape an electrical storm in the vicinity of Chicago and the other was made in order to clean spark plugs which had become fouled. Neither landing was caused by a dead engine.

WM. MAYO HEADS DETROIT AVIATION SOCIETY

Wm. B. Mayo, Chief Engineer of the Ford Motor Car Company and Chairman of the Aviation Committee of the Detroit Board of Commerce, was elected president of the Detroit Aviation Society at its annual dinner held at the Brooks-Cadillac, Wednesday, May 27.

Other officers selected for the coming year are: Edwin Denby, honorary president; Jesse G. Vincent, first vice-president; Howard E. Coffin, second vice-president; Charles T. Bush, treasurer; Carl B. Fritsche, secretary and Russell B. Shaw, assistant secretary. The Board of Directors chosen are: Herbert W. Alden, Harold H. Emmons, George M. Holley, Angus McLean, E. Leroy Pelletier, William E. Scripps, Paul Strasburg, Alex Dow, Edsel B. Ford, W. H. H. Hutton, Jr., William Metzger, Mason P. Rumney, William B. Stout, Ralph Upson and Sidney B. Waldon.

THE AERIAL SURVEY COMPANY OF MICHIGAN

The Aerial Survey Company of Michigan has been formed to serve the aerial photography field in the midwest. The company's offices are located at 1019 Lafayette Building and a flying field is maintained at the junction of John R and Fourteen-Mile Road, Detroit.

The company will make lineal maps of highways, railroads, transmission lines and rivers; of cities, towns, sub-divisions and traffic surveys and engineering surveys for municipal planning of every nature. The company will also take oblique photographs of industrial centers, factory units, office buildings and golf courses.

The officers are R. M. Baughey, general manager; M. Franklin Burrows, director of operations; F. M. McCullough, chief engineer; and Paul W. Eberle, chief-pilot.

The Aerial "Glidden Tour"

UP until the period of the present writing upward of fifty airplanes have been tentatively entered in the first American inter-city airplane tour. This number is the average of estimates made by the aviators themselves who will enter machines and who have responded with enthusiasm to the proposal to organize the event, which was endorsed recently by the board of governors of the National Aeronautic Association at a meeting in St. Joseph, Mo. William B. Mayo, of Detroit, in a conference with Carl B. Fritsche, chairman of the contest committee of the Association, which will prepare the rules for the contest, voiced the evident sentiment of the airplane interests when he said, "Let us make it the best commercial meet in history."

The Society of Automotive Engineers has received more than fifty responses from commercial aviation companies and individual owner-pilots, who have offered many interesting and valuable suggestions for the conduct of this event. Among these are some of the largest operators in the country.

The Air Mail has undoubtedly done more than any other agency to demonstrate the practicability and safety of airplanes in regular intercity transportation by air in this country, yet there are in hundreds of cities companies and pilots that have carried thousands of passengers in safety. Among the suggestions made and now under consideration are that both trophies and cash prizes be offered to contestants, that gasoline and other supplies be furnished free, that the competitors be permitted to carry passengers from city to city on the tour and take passengers up for flights in each city where stops are made, and that short races and stunt events be held in the different cities.

The proposed tour, properly organized and under competent direction, is expected to establish the practicability of aerial transportation of passengers and freight, encourage the establishment of landing fields in cities where none now exist, encourage laymen to buy and use private airplanes, stimulate the building of airplanes to meet new requirements and generally stimulate the development of aviation in America.

Plans already formulated contemplate an "on to Detroit" event for competitors from all over the country, to end in Detroit on September 5, with cash prizes to all entrants who fly from a distance of 175 miles or more, and the starting of the inter-city tour on Labor Day, September 7. The cities now listed in the preliminary way to be included in the tour are Fort Wayne, Chicago, St. Louis, Indianapolis, Dayton, Columbus and Cleveland, with the start and finish at Ford Airport, Dearborn, Mich. As the success of the event will depend largely upon the support in the way of local equipment, facilities and finance given by the various cities finally selected as stopping places, the list as given is subject to change. So far as entries and conduct of the contest are concerned, the tour is assured of the active support of leading men in aviation circles.

There are more than 400 commercial aviation companies and individual pilots in the country, including aerial transportation companies, aviation schools, flying field and exhibition companies, and other operating special services such as sky advertising, photographing, mapping and surveying by airplane. These are distributed from New Hampshire to Southern California and from Florida to Seattle, Wash. There are also a number of commercial airplane services in Canada, located in Montreal, Toronto, Winnipeg and Saskatchewan. Even Alaska is included and there is a British Columbia commercial flying company. The various companies and individual owner-pilots operate all the way from one to thirty-five or more planes each.

INTER-CITY AIRPLANE TOUR

In the Matter of Available Entries together with Comments on Desirability and Conditions of the Tour

The information summarized in the following has just been secured from representative pilots and airplane operating organizations.

The specific matters to which the information applies are set forth in the questions listed.

The purpose of collecting the data was to ascertain what support is forthcoming from the Inter-city Airplane Tour that has been proposed, and also an expression of opinion as to the desirable conditions of such an event.

It will be noted that the names of those who have made reports are not given. The various items are keyed by numbers with respect to the individuals and companies. The purpose of making the summary in this form was to prevent its being too cumbersome.

Those who wish to comment upon the summary or to ask questions about it will please communicate with the Society of Automotive Engineers, 29 West 39th St., New York City.

GENERAL SUMMARY OF AIRPLANE TOUR QUESTIONNAIRE RETURNS

Question No. 1

Would you consider entering an airplane in a tour, such as that outlined in accompanying letter,

(a) if **only** trophies were offered?

(b) if **both** prize money and trophies were offered?

Summary

(1) If only trophies were offered, 14 would enter planes and 11 would not.

(2) If trophies and prize money were offered, 32 would enter planes.

(3) If prize money only were offered, 2 would enter planes.

(4) Five would not enter planes under any conditions.

Question No. 2

What suggestions have you to offer regarding rules and regulations relative to the tour?

Summary

(1) Suggest rules be left to N. A. A. 4

(2) Suggest stunting be prohibited 3

(3) Suggest rigid inspection of ships 4

(4) Suggest prohibiting alcohol 2

Question No. 3

Would you care to carry passengers at the various stops?

Summary

(1) Would care to carry passengers 27

(2) Would not care to carry passengers 8

Question No. 4

How could the entrants make money out of the tour aside from prize money?

Summary

(1) Carrying passengers between stops 25

(2) Carrying advertisements on plane 25

(3) Sight-seeing on exhibition flights 6

(4) Carrying passengers for entire tour 4

(5) Aerial photography 4

(6) Distributing literature 1

(7) Carrying freight between stops 1

(8) Carrying reporters for entire tour 1

(9) Parachute jumps 1

(10) Special aerial advertising devices 1

Question No. 5

Do you consider that there might be adverse publicity due to accidents?

Summary of Answers

Yes	6
No	12
Not if planes are airworthy	9
Not if pilots are competent	9
Not if tour is properly conducted	7
Not if flight regulations are enforced	3
Not if held over suitable country	3
Not if pilots use good judgment	1
Not if stunt flying is prohibited	1

Question No. 6

What restrictions, if any, would you put on those entering the tour?

Summary

(1) Adequate examination of pilots	24
(2) Adequate examination of planes	18
(3) No stunting or low flying, etc.	6
(4) Entrants should be civilians	3
(5) Planes should be inspected at each stop	2
(6) Regular flying rules should be enforced	2
(7) Loads should be limited	2
(8) Follow N. A. A. rules	1
(9) Pilots should hold F. A. I. certificates	1
(10) Obsolete planes should be barred	1
(11) Parachutes should be carried	1
(12) Firewall between engine and pilot	1

Question No. 7

How many airplanes would you consider as possible entrants in such a tour,

(a) if prize money is offered?

(b) if not?

Summary

Of 20 replying to question No. 7a, the average of the estimates is 50. Of the 12 replying to 7b, the average is 25.

Question No. 8

How much prize money do you consider as necessary per stop?

Summary

$5000—750
5000—500
2000—500
1000—100
1000—50
1000—20

Four suggested enough prize money to cover expenses of entrants.

Question No. 9

Would it be better to put up all money in prizes, or should all the entrants be furnished accommodations?

Summary

(1) Prefer accommodations be furnished	19
(2) Prefer all money in prizes	9
(3) Prefer combination of both	4

Question No. 10

Would it aid in getting entrants if fuel and oil were furnished and the prize money cut down?

Summary

Yes	35
No	4

Question No. 11

Please state why you think such a tour would or would not be beneficial to aviation.

Comments

6—It would be very beneficial for establishing the practicability of aerial transportation when properly handled, and encourage civic aid in landing fields and supplies.

22—It would be beneficial to the extent that it would prove that a practical cross-country touring type of plane can be produced, diverting the public mind from the conventional military and stunt-type airplane.

23—Unless great care is taken to insure safety regulations and equipment inspection, I am afraid the results would be of no benefit to aviation. This precaution is needed more in this case than in any other due to the large number of planes in close proximity to each other, which few of the pilots are used to.

25—Reliable aircraft and qualified pilots should tend to prove the advantages and safety of inter-city commercial flying.

65—A properly conducted tour would be of great benefit to aviation and create confidence in the minds of the public as to safety in cross-country flying.

108—Good conservative flying would do much to encourage flying with the layman as a number of planes would attract crowds and many passengers would be carried. Every passenger properly carried is another booster for aviation.

109—It would be beneficial, but do not give too much publicity until well on its way.

112—It would get more people interested, show what the present aeroplane can do and cost less than one big meet, as expense would be spread among a greater number.

119—Any organized commercial flying along careful lines is bound to be beneficial to aviation and doubtless encourages public interest and support.

142—(1) By stopping at towns where no municipal field existed it would help create an interest in aviation and help get fields at various cities. (2) Prove that aviation is safe to the public.

144—Such a tour would not be a success because the commercial pilots have not the money to start such a tour and the business men who fly for pleasure or to get somewhere quickly have no time for such a trip.

153—It would be beneficial because it would educate the people, proving to them that aviation properly conducted is safe and that the airplane of today is a success in every sense of the word.

156—This would be a great benefit to aviation as commercial aviators encourage and teach the public wherever they land.

168—Decidedly beneficial if properly conducted.

175—It would be a gamble. If free from accidents, it would be beneficial.

178—It would be fine to prove the reliability of the airplane.

196—Beneficial if properly handled all around.

207—It is a "bully" idea for aviation.

210—It would be very beneficial, I have been strongly recommending such a tour for two years.

224—Would stimulate interest and educate general public..

225—Most people do not realize the number of civilian planes in use. A tour of 50 or more ought to inspire confidence in the game.

230—It would acquaint the public with the progress made in commercial aviation.

235—I think it would be beneficial because it would enable operators of aircraft to put over the idea that airplanes are quick, safe transportation to so many more people and by direct competition would bring out the good and bad points of present commercial ships.

285—The publicity and demonstration would be wonderful. We tried it at Aberdeen, S. D., last year.

288—If properly organized and financed, the tour would undoubtedly get aviation much favorable publicity; people along the route would become interested in the possibilities of aircraft for transportation, advertising, photography and pleasure; would encourage putting in landing fields. It would be invaluable to the designer of new types of commercial aircraft.

296—The tour would indicate that the automotive industry had entered aviation as a sound industry and would encourage dealers to look forward to aviation as a future.

The tour would interest cities to establish landing fields and further interest air transportation; while on the other side, it will encourage airplane construction to meet the new requirements.

297—It would be a national demonstration of reliability and general utility of aircraft.

303—We think it would be beneficial because it would bring the new commercial ship before the public.

317—A tour of this kind would stimulate aviation,

and the newspapers would give wide publicity to intercity travel.

321—Would encourage cities to establish landing fields and stimulate public interest in flying.

25—The tour would show the people the practical use of airplanes.

334—It would attract the attention and interest of many people who would not otherwise become interested in aviation for some time, perhaps years, and it would stimulate the interest of others who are already interested to a certain extent.

367—Anything that will focus attention of public is beneficial if constructive. Eliminate amateurs as accidents are destructive and negative advertising.

373—The people of this country are just beginning to see the advantages of traveling by air and such an event as you suggest would do a lot towards informing the public of the practicability of aerial travel.

410—If properly conducted it would be beneficial to aviation as it would enlighten a great many people who otherwise would not have opportunity to see a plane.

Question No. 12

Please suggest a route for the proposed tour.

Comments.

6—Detroit, Chicago, St. Paul and Minneapolis, Kansas City, St. Louis, Louisville, Dayton, Detroit. Other cities could be included, depending on the amount of encouragement or assistance received from them. Or a route could be laid out to include only those who contribute to the fund for putting on such a tour.

23—At the present time, the middle-west is the only place, though I would personally rather see it in the east for this section of the Country needs stimulation.

25—Detroit to Chicago to Cincinnati return to Detroit making one stop between each of the above cities.

112—It depends somewhat on where they hold the Pulitzer Race. I think it should end at that city. Buffalo, Cleveland, Detroit, Chicago, Albany, Hartford and Boston all have or are developing fields and should be interested. Should also consider St. Louis, Kansas City and Columbus.

144—The route should be laid entirely in the middle-west where fields are more numerous and many plane owners are agriculturists and could get away between seasons.

153—Wichita, Chicago, Detroit, Buffalo, New York, Pittsburgh, Dayton, San Antonio, El Paso, San Francisco, Denver, Wichita.

168—This route depends entirely upon the amount of prize money available, but I would suggest that it cover a territory containing both mountainous and plains country and varying considerable as regards altitude and general weather conditions.

178—Chicago, Davenport, Des Moines, Omaha, St. Joseph, Kansas City, Jefferson City, St. Louis, Peoria, Chicago. All these cities have flying fields and are interested in aviation.

196—Do not make this first tour too difficult. Keep to cities or tours having adequate flying fields. It seems to me that if such a tour could be accomplished successfully, the benefits would be great.

207—Washington, Baltimore, Philadelphia, New York, possibly Boston and Richmond.

210—Boston, Hartford, New York, Philadelphia, Baltimore, Washington, Cincinnati, Dayton, Columbus, Akron, Cleveland, Detroit or some route which included Chicago, Omaha, St. Joseph, Kansas City, St. Louis and other middle-western towns.

235—Hartford, Boston, Albany, Syracuse, Buffalo, Cleveland, Detroit, Chicago, Kansas City, St. Louis, Cincinnati Harrisburg, Hartford. It could start at any one of these places and make the circuit.

240—New York, Washington, Roanoke, Knoxville, Birmingham, New Orleans, Houston, San Antonio, Sanderson, El Paso, Tucson, Yuma, San Diego, Los Angeles, San Francisco, thence over Air Mail route to New York. This route has "hops" of even length, touches practically all sections of the country and would be a wonderful demonstration as planes would cross forest, swamps, plains, deserts and mountains. A good pilot, flying a good plane would make this trip without difficulty.

278—Missouri, Kansas, Oklahoma, Nebraska, Iowa and Illinois.

235—Minneapolis, Chicago, Indianapolis, St. Louis, Kansas City, Omaha, Sioux City (or Sioux Falls), Minneapolis, stopping at all larger cities on or near route, say 5000 or over.

288—I know nothing of eastern possibilities. For the west coast: Los Angeles, San Diego, El Centro, Yuma, Phoenix. From here ships would either take the high or low altitude run depending on their capabilities. High altitude; Albuquerque, Winslow, Needles, Las Vegas, Milford, Salt Lake City, Reno, Sacramento, San Francisco, Modesto, Fresno, Bakersfield, Los Angeles. Low altitude, from Phoenix, Blythe, Ludlow, Mojave, Bakersfield, Fresno, Modesto, Sacramento, and from there pick up the High-Altitude Run. First tour should be simple in order to insure against adverse publicity. Later when it is more definitely known what can be expected, the more difficult the better.

296—The tour should be made where the best flying fields and conditions are available; say, starting at Columbus, going West to Dayton, Indianapolis, Fort Wayne, Cleveland, Toledo, Detroit, Lansing, Kalamazoo, Chicago, Davenport, Minneapolis, Omaha, Kansas City, St. Louis. In this manner your tour will be in the Central West and where there is already available landing fields, with good surrounding community and fairly good between points.

297—From New York City up the Hudson and across the state to Chicago covering the principal cities; over the mail route to San Francisco ;up to Seattle; down to San Diego; across to Galveston; along the coast to Pensacole; up to Birmingham; to Atlanta; to New York. Entrants to join in at the nearest city and follow route for 1000 miles, then returning home.

321—New York, Boston, Albany, Syracuse, Rochester, Buffalo, Cleveland, Detroit, Chicago.

334—Would suggest three routes. North Eastern Chicago, Detroit, Cleveland, Pittsburgh, New York, Washington, Richmond, Va., Huntington, W. Va., Cincinnati, Louisville, Indianapolis, Ind. South Eastern —Memphis, Nashville, Chattanooga, Atlanta, Augusta, Jacksonville, Miami, Tampa, Lake City, Pensacola, New Orleans. Western—Dallas, San Antonio, El Paso, Phoenix, San Diego, Los Angeles, San Francisco, Portland, Seattle, Spokane, Helena, Fargo, Minneapolis, Des Moines, Kansas City, St. Louis.

373—New York to Philadelphia and return.

410—Only through the flat country of the Central States.

The Dayton-Cincinnati Air Line

WHILE public interest is centered on the Detroit-Chicago air line being instituted by the Ford Motor Car Company and of the more recent $10,000,000 organization known as the Air Transport, Inc., which contemplates opening a regular air route between New York and Chicago there was inaugurated in Dayton on June 1, with fitting ceremonies, a commercial air line between Dayton and Cincinnati.

This line which is operated by the Johnson Airplane & Supply Company, well-known commercial firm, will run five ships daily between the two cities carrying both passengers and parcels.

View of the Johnson Airdrome at Dayton, Ohio, with fleet of ships on the line.

Left, Pilot Jack Laass; Right, E. A. Johnson, president Johnson Airplane & Supply Co.; lower left, Pilot Clyde Emerick.

Before going into the air line project Mr. E. A. Johnson, president of the firm which is conducting the new line made an exhaustive study of the conditions. Under his direction the Johnson firm has gained for itself the distinction of being the first strictly commercial concern to make money and prosper. This new project can therefore not be regarded as a "wild cat venture," but a well merited broadening of their business activities.

At eight o'clock on the morning of June 1 five ships left the Johnson airdome east of Dayton. Among the passengers were Congressman Roy G. Fitzgerald, Mayor Frank B. Hale, of Dayton, with several news

Reading from left to right: Mayor George Carrell, Cincinnati; Mayor Frank B. Hale, Dayton; Congressman Roy G. Fitzgerald, Ohio; E. A. Johnson, pres., Johnson Airplane & Supply Company.

reporters and a photographer. Some forty minutes later the sixty-mile jaunt ended as the ships set down gracefully at Turkey Bottoms on the eastern outskirts of the Queen City where a delegation of some 200 Cincinnati aviation enthusiasts headed by Mayor George Carrell were present to greet the air party. Mayor Carrell was handed a letter of congratulation from the Dayton Chamber of Commerce. Pilot Emrich who delivered the missive was handed a similar letter from the Cincinnati Chamber for delivery to the Dayton body.

Commenting on the inauguration of the new air line Congressman Fitzgerald, a nationally known aviation enthusiast, made the following statement:

"The time is not far distant when such transportation as this will be commonplace. There was a unique feature of this trip which was graphically pointed out as we passed over the town of Franklin. Here below us I beheld the Miami River, the old Miami-Erie Canal, the electric traction line, the steam railway, and the Dixie Highway, all running parallel. Our aerial convoy completed the list of five modes of transporation—a most unusual and inspiring picture."

Mayor Hale asserted that "Dayton was boosting this new air line, and that the people of the 'nation's air center' were confident that the venture would prove a financial success and consequently a permanent route."

"I predict success for the venture," declared Mayor Carrell "and believe further, that this line presages the gradual linking of all Ohio cities by an aerial passenger and express line. The Johnson firm and Dayton are again to be congratulated for their pioneering work and the position they are maintaining in the promotion of commercial avition."

For the present, passengers alone are being carried at a rate of $25.00 for the round trip. Later various parcels and express matter will be transported.

AL VERVILLE TO BUILD COMMERCIAL PLANE

Alfred Verville, well-known Air Service designer of race planes who recently resigned his position with the Army Air Service to take up work in the Commercial field as an official of the Buhl-Verville Airplane Company, of Detroit, announces that he has started the design of a small commercial ship for freight carrying.

The newly organized firm of which Mr. Verville is a member first intended to produce a military pursuit ship, but as the recent announcement indicates, a close eye is being kept on the possibilities in the Commercial market.

AIR MEETS AT TWO MICHIGAN CITIES

Both the city of Battle Creek and Lansing are planning aviation meets during the coming summer, according to word received from Talbert Abrams, well-known figure in mid-western air circles, and who was recently appointed secretary of the Michigan Commercial Aviators' Association.

Battle Creek proposes to offer prizes totaling between $5,000 and $7,000 for a meet scheduled for early September and lasting three days.

Lansing has planned a meet for July 29, 30, and another for August 1 and 2.

Courtesy—The Detroiter

The first picture of the men who organized the $10,000,000 air line in Chicago, May 21. Front row, left to right: Wayne C. Taylor, Marshall Field, Glore, Ward & Co., Chicago; Col. Paul Henderson, who resigns as Second Assistant Postmaster General to become general manager of the line; John J. Mitchell, Jr., Illinois Merchants Bank, Chicago; C. M. Keys, president Curtiss Aeroplane & Motor Co.; Daniel Schaefer, and Howard E. Coffin, of Detroit, who was elected president of the new company. Second row, left to right: Wm. E. Metzger, Detroit; Philip Wrigley, Chicago; Chester W. Cuthell, Philadelphia; Earl H. Reynolds, Peoples Trust & Savings Bank, Chicago; Leonard Kennedy, Leonard Kennedy Co., New York, and Charles L. Lawrence, president Wright Aeronautical Corp., New York. Upper rows, left to right: Charles F. Glore, Marshall Field, Glore, Ward & Co., Chicago; Wm. MacCracken; Francis J. Tietsort, Detroit; C. M. McKenzie, Detroit; Carl B. Fritsche, of Detroit, named secretary of the company; W. J. Austin, Austin & Co., Cleveland; Wm. A. Mara, Detroit Board of Commerce, Detroit; Ralph H. Upson, Aircraft Development Corp., Detroit; Lt. Van Zandt, U. S. Air Service; Trowbridge Calloway, Calloway, Fish & Co., New York; C. T. Ludington, Philadelphia; W. T. Develin, Philadelphia; George H. Klein, Clark, Emmons, Bryant & Klein, Detroit; and D. S. Richard, Charles A. Parcells Co., Detroit.

The $10,000,000 Airline

By WM. A. MARA

DETROIT maintained its position in the aircraft industry when Howard E. Coffin, vice-president of the Hudson Motor Car Co., was named by a score of the country's most prominent business men, as president of the National Air Transport, Inc., a $10,000,000 corporation, and the first effort on the part of private capital to operate a strictly commercial air line on a large scale. The executive offices will be located in Detroit.

While the National Air Transport was officially organized in Chicago on May 21, it had its inception at a meeting held at the Detroit Club on April 28.

In addition to Mr. Coffin there are the following other Detroit men actively associated with the project: Third Vice-President, Eugene W. Lewis of the Industrial Bank, Detroit; Secretary, Carl B. Fritsche; Harold H. Emmons former president of the Detroit Board of Commerce, Wm. E. Metzger, Walter L. Briggs of the Briggs Mfg. Co.; C. F. Kettering, president General Motors Research Corp.; and George M. Holley, Holley Carburetor Co.

The National Air Transport will operate a night airline furnishing over-night service between New York and Chicago as the first unit of a series of similar lines which the Company plans to place in operation.

$2,000,000 has already been paid in and no stock will be offered for public sale.

It is expected that service will be inaugurated early in the fall and while a definite schedule has not yet been prepared, it has been decided that planes will leave New York about 9:30 p. m., flying over a lighted airway, and arriving in Chicago at approximately 5:00 a. m. Freight and express dispatched from New York late in the evening will be delivered in Chicago early the following morning, thus effecting a saving of at least one whole day. No passengers will be carried by the line, its activities being devoted to freight, mail and express only.

Colonel Paul Henderson, Second Assistant Postmaster General, will become general manager of the air line on August 1. Colonel Henderson who has been in charge of the operation of the United States Air Mail Service and who is given credit for the expansion, development and successful operation of the Air Mail, announced that he would hand his resignation to President Coolidge at once.

Colonel Henderson's resignation will not take effect until August 1, in order that he may carry out the program for an over-night government Air Mail Service between New York and Chicago, on which he has been working for some time.

When interviewed by the writer Colonel Henderson said: "For many years I have been a firm believer in the possibilities of commercial aviation. My action in resigning as Second Assistant Postmaster General and in associating myself with Mr. Coffin and the other gentlemen who have organized the National Air Transport, Inc., is a concrete expression of this belief.

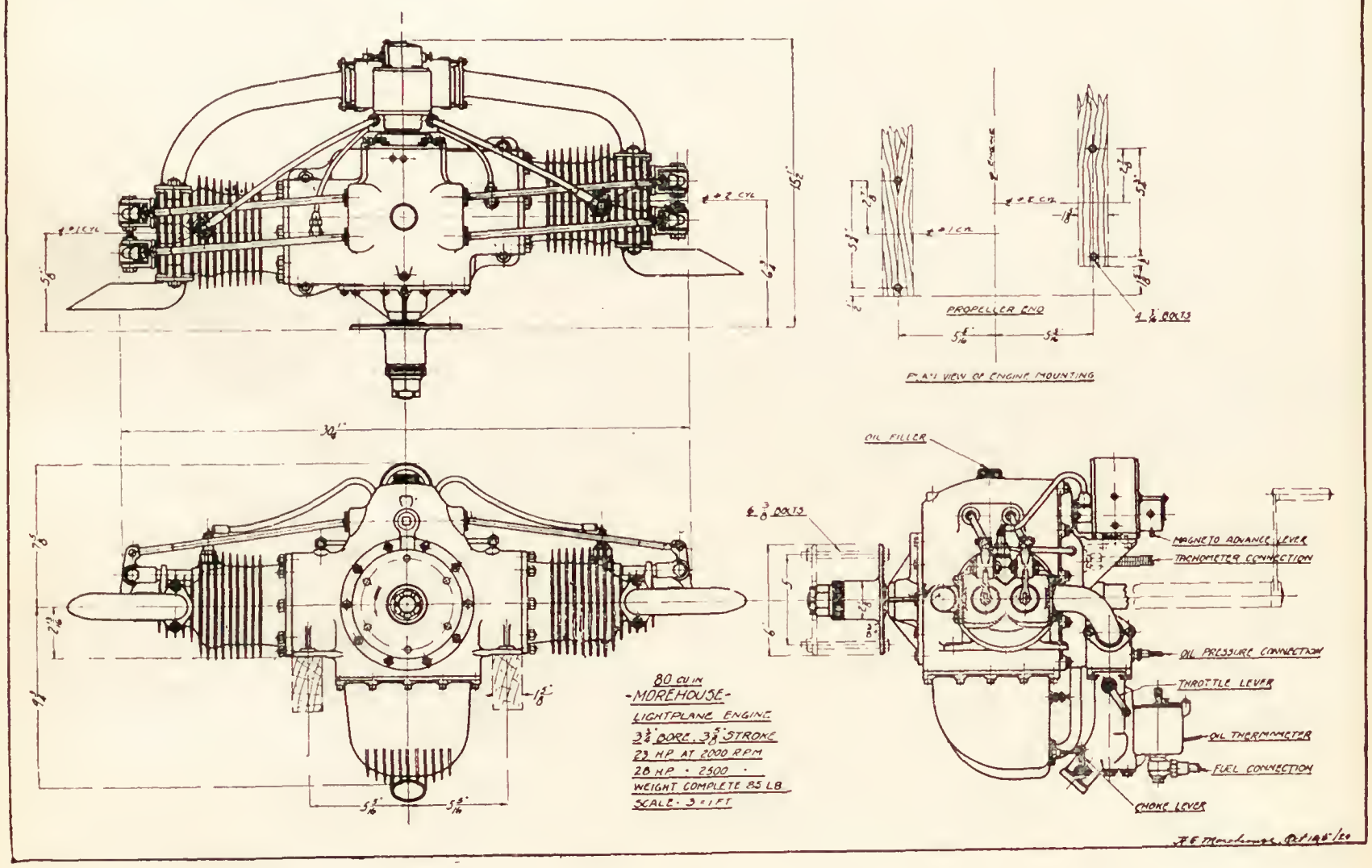
"In a sense the New York-Chicago airline is a pioneer effort on the part of business men to operate commercial aircraft without government subsidies. In Europe air lines receive financial assistance from the various governments but because subsidies have never been popular in this country assistance of this kind has not been extended to aircraft operators

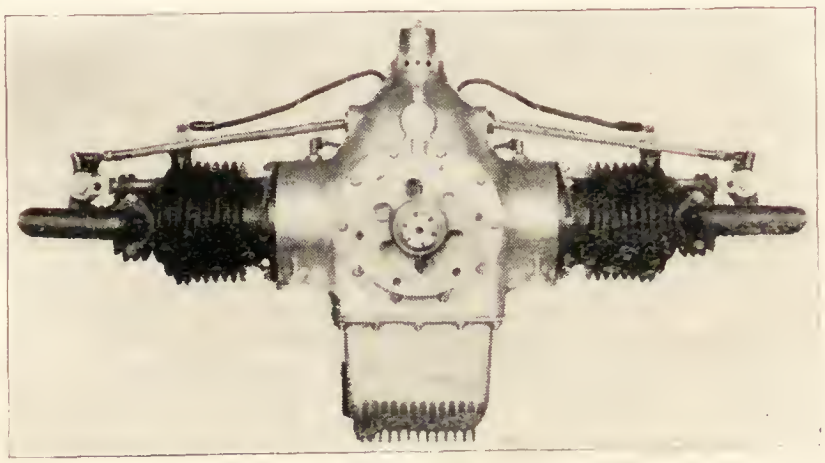
"Aeronautics in America must stand on its own feet and succeed by reason of the service it renders.

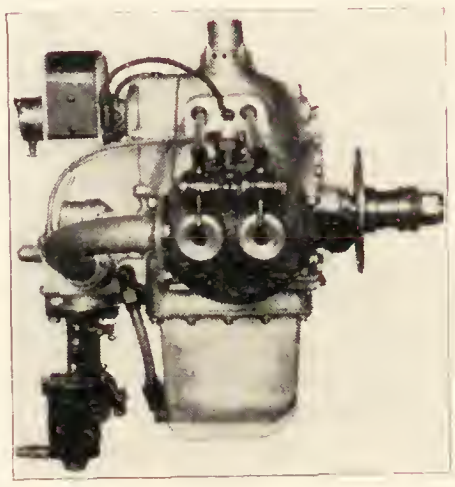
"It is with regret that I plan to leave the Post Office Department. My associations there have been particularly pleasant and I am glad that it has been my privilege to play a part in the development and opera-

(Continued on page 21)

The New Morehouse Light Plane Engine







A NEW engine for light plane use has been brought out by Mr. H. E. Morehouse of 39 Gebhart St., Dayton, Ohio. This new power plant as shown in the accompanying photographs is of very simple and rigged construction, with no new or untried features in its design. There are no standard parts used at any point in the engine and nothing has been spared to assume its fulfilling the requirements of aircraft use. Of moderate output for its displacement it should operate for considerable periods of time between overhauls. The first engine was submitted to McCook Field for calibiation tests and the most remarkable results were promptly obtained. The overall dimensions are shown by the installation drawing. The engine can be fitted with a propeller reduction gear if desired.

The Morehouse 80 cu. in. engine is the two cylin- opposed four cycle air cooled type having a bore of 3.750″ and a stroke of 3.620″. The compression ratio is 5.0:1. The engine is rated at 28 h. p., at 2500 normal r. p. m., and its weight complete as shown is 85 lbs. (dry).

As in motor car practice plain babbitted bearings of very ample dimensions are used throughout the engine, together with a pressure oiling system to all bearings.

The crankcase is a sturdy aluminum casting of one piece. It is mounted in such a way in the plane that the oil simp may be lowered, cylinders or rear cover together with accessories removed, and even the

(Continued on page 20)

The Design of Air-Cooled Cylinders

By C. FAYETTE TAYLOR

(Reprinted from the Wright Aircraft Builder)

ADAPTABILITY TO ENGINE. (a) Unlike the water-cooled engine, which may have almost any cylinder arrangement, the air-cooled engine must be arranged primarily to secure proper cooling conditions for the cylinders. In other words, the engine must be to a large extent designed for the cylinders, rather than the cylinders for the engine. However, the design of an air-cooled cylinder is influenced considerably by the type of engine on which it is to be mounted and the position of the engine relative to the stream of cooling air. These considerations affect the size of the cylinders, the arrangement of the cooling fins, the position of the intake and exhaust ports, and the location of the valve gear supports and spark plug bosses.

(b) **Maximum power output** consistent with a reasonable fuel consumption. This is attained through correct combustion chamber design, suitable arrangement of ports and valves, and proper provision for cooling.

(c) **Durability.** The Army and Navy now require a minimum period between overhauls of approximately 200 hours of running, and entire freedom from major failures. These results are obtained by proper selection and disposition of material, by proper lubrication of the bearing surfaces, and by sufficient cooling of all parts to avoid burning of the material, destruction of the lubrication, or fatigue failure brought on by an overheated condition of the metal.

(d) **Light weight** is a fundamental consideration in all aircraft equipment, but it cannot be obtained at any considerable sacrifice of the first three items. Light weight is secured by careful selection and distribution of materials, always bearing in mind the consideration noted under (a), (b) and (c).

(e) **Cost of Production.** While this is a very important consideration, it must be placed at the bottom of the list for military equipment, since it is not desirable to make any extensive compromise in the other requirements simply to reduce production costs. For commercial aeronautics, however, this would be one of the most important requirements, and some of the others might have to be compromised in its favor.

It is the purpose of this article to show how the fundamental requirements stated above are applied in detail to the design of air-cooled cylinders for military engines.

Adaptability To Engine

Before starting the design of the cylinder, it is necessary to know the type and arrangement of the engine on which it is to be used, the normal speed of crankshaft rotation, and the power output required. It is also necessary to know the kind of fuel which is to be used, as this determines the maximum compression ratio which may be used. The term "compression ratio" is defined as the ratio of the combustion chamber volume with the piston at top dead center to the total cylinder volume with the piston at bottom dead center. For air-cooled cylinders operating on aviation gasoline, the practical high limit on compression ratio seems to be from 5.0 to 5.5, depending on the size of the cylinder. Having determined the compression ratio, we know from experience approximately what power may be obtained per cubic inch of displacement for a cylinder of average design at a given speed of rotation of the crankshaft, Table 1 shows this for aviation type air-cooled cylinders running at various speeds, with a compression ratio of 5.2.

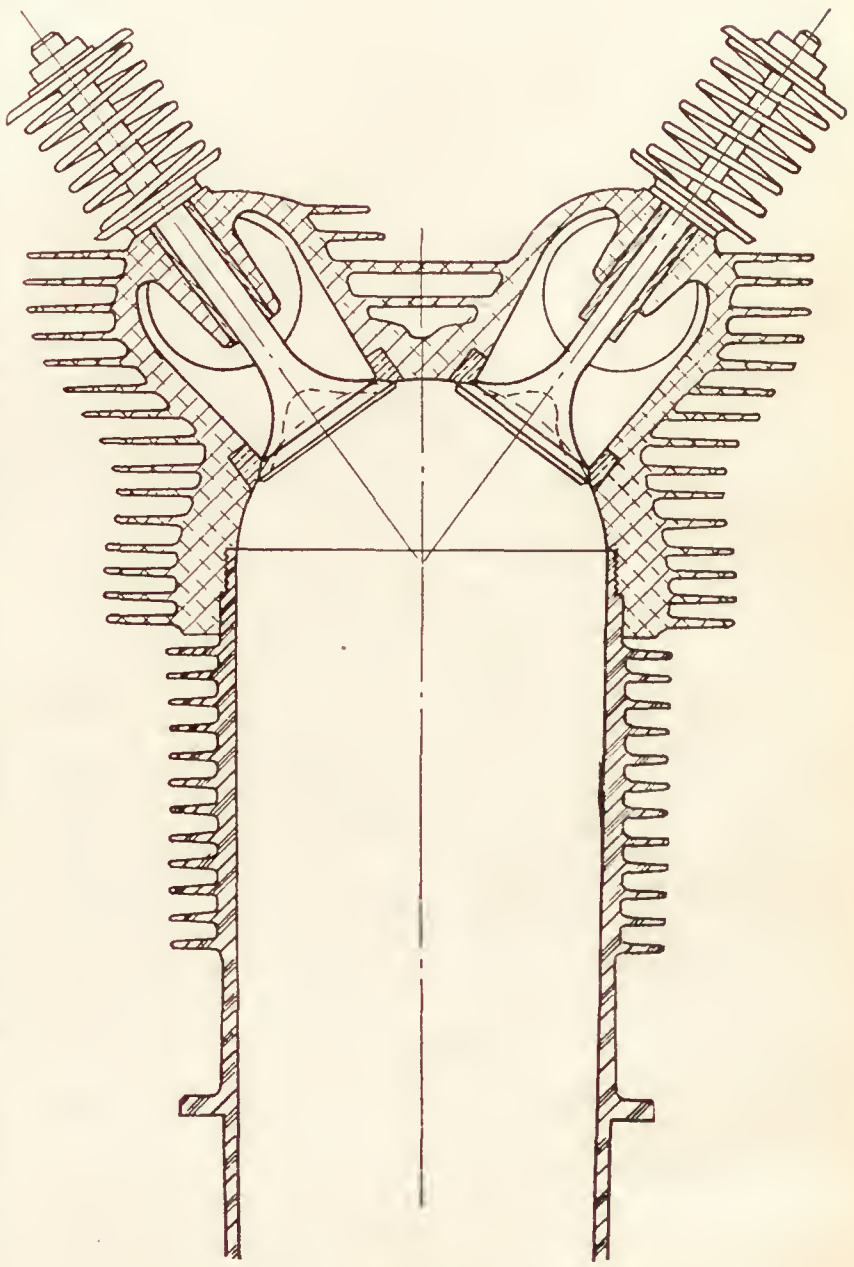


FIG. 1

If our engine is to run, for instance, at 2,000 r.p.m. and is to give 40 h. p. per cylinder, we can find the necessary piston displacement by selecting from table 1 the figure in the third column opposite 2,000 r. p. m. and multiplying it by 40. This gives 133.3 cu. in. as the displacement necessary for the cylinder taken as an illustration.

Having determined on the displacement for the cylinder, it is necessary to select a bore and stroke which will give this displacement. Whether to select a large bore and a short stroke or a small bore and a long stroke, depends somewhat on the type of engine for which the cylinder is to be used. It is sometimes permissible to use a long stroke cylinder on a V--type or vertical engine, but on a radial engine this would be objectionable on account of the resulting large diameter of the engine. One very important consideration is that there is room for larger valves in proportion to the displacement in the large bore, short stroke cylinder. Modern American aircraft engine practice has tended toward cylinders in which the stroke is only slightly greater than the bore diameter, and in these engines the ratio of bore to stroke ranges from .71 to 1.0, the latter being the so-called "square cylinder," where the bore is equal to the stroke.

Since the cylinder with relatively large bore makes

possible the use of large valves, we may assume a bore-stroke ratio of .91. In order to get the desired 133.3 cu. in. and maintain this ratio, we have a cylinder of 5⅜″ bore by 5⅞″ stroke.

The compression ratio, bore, and stroke of the engine having been determined, we are now ready to lay out the cylinder on the drafting board and proceed with the detail design.

Power Output

The data given in table 1 shows the power output which may be expected from the average design. It is possible, however, to exceed these values appreciably by careful application of the principles noted herein, and this will give a very desirable margin in excess of the power actually required from the engine.

It is hardly desirable to secure high power at the expense of fuel economy. Fortunately, however, conditions favorable to a high power output tend to result also in good fuel economy, so that these two factors can well be considered together.

The power output for a given size and speed is controlled largely by combustion chamber design, size of valves, size and shape of ports, and cooling of the cylinder. It has been the experience of nearly all experimenters that the nearer one can approach to a spherical combustion chamber, the better will be the results obtained. This eliminates from consideration the irregular combustion chamber necessitated by the L head or T head engine, and confines us strictly to the overhead valve engine which is now universal in aircraft practice. If the combustion chamber is to be approximately spherical in form, the cylinder head must be approximately hemispherical and the valves and ports must be inclined to the horizontal, as illustrated in Figure 1. Incidentally, this shape of combustion chamber facilitates the cooling of the cylinder, since it is well exposed to the air blast and has a large surface for the application of cooling fins. Figure 2 shows an inferior design having a flat combustion chamber head. It has been found that this type of cylinder always runs hotter, gives a much higher fuel consumption, and generally gives a lower power output than the type shown in Figure 1.

Having determined the shape of the combustion chamber, it becomes necessary to decide upon the size of the intake and exhaust valve. Experience has shown that in order to develop maximum power, it is necessary to have one square inch of intake valve opening for each 32 cubic inches of piston displacement. It is desirable to have an equivalent amount of exhaust valve opening, but where the space for the valves is restricted, the exhaust valve size may be reduced to a point where one square inch of valve opening serves as high as 40 cu. in. of piston displacement. Experiments have shown that it is possible to lift the valves to a height as great as one-fourth of their diameter and still count on the full area of the valve opening, provided there is sufficient space between the edge of the valve and side of the combustion chamber, so that the gas flow will not be restricted at this point. The figures given for valve area apply to the present tendency in air-cooled engine design, where the engines are run at speeds not exceeding 2,000 r. p. m. For the very high-speed engines, one square inch of valve opening for every 25 cu. in. of piston displacement is desirable.

For the cylinder taken as an example, we may assume that the normal operating speed will not exceed 2,000 r. p. m., and that one square inch of valve opening area will be provided for every 32 cu. in. of piston displacement for both intake and exhaust. For cylinders of less than 200 cu. in. displacement dual valves appear to be unnecessary, and therefore, for the engine in question, only one inlet and one exhaust valve should be used. Assuming that the valve lift will be one-fourth of the valve diameter, we arrive at a valve diameter of 2 5-16″ in the clear with a lift of 9-16″. Since the design

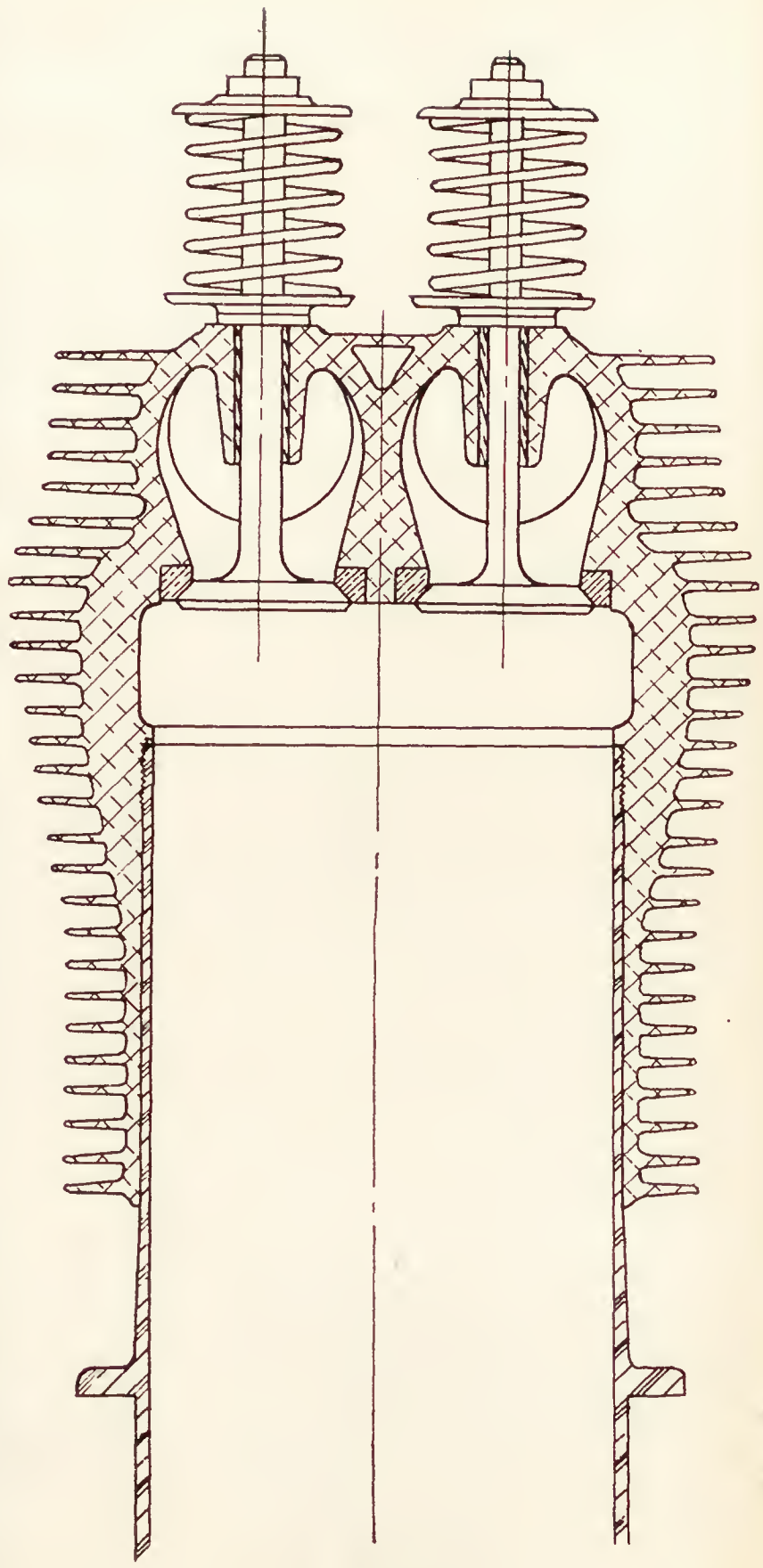


FIG. 2

of ordinary poppet valves, aside from their size, has a minor effect on engine performance, further details of valve design will be considered under the headings of "durability" and "cooling."

One of the most important considerations in securing maximum power output is the size and shape of the intake and exhaust ports. The internal shape of the ports must be such as to offer the minimum resistance to the flow of the gases in and out of the cylinders, while their external shape must be such as to accomodate reasonable forms of intake and exhaust manifolds, and to offer the least possible interference to the flow of the cooling air around the cylinder head. In order to offer the least possible restriction to gas flow, the passages within the ports must have easy bends with plenty of area at the bends, especially around the valve guide bosses. Rapid changes of section must be avoided, and the area of any section of the passage must always be as great as, or greater than, the clear area of the

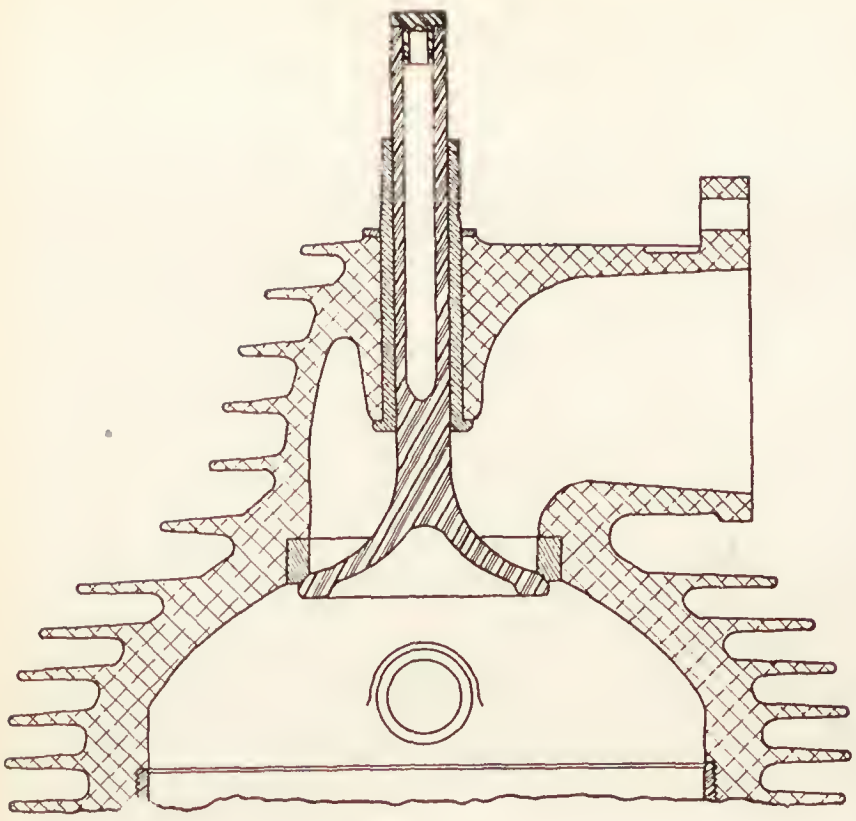


FIG. 3

valve opening. The external shape of the port will be considered under the next heading.

Cooling

Perhaps the most difficult problem in air-coooled cylinder design is to secure proper cooling. In considering this problem, two principles must be kept in mind, namely:

1. The parts which receive the most heat are the parts which require the most cooling air.
2. The blast of cooling air must impinge as directly as possible on the parts to be cooled, with a minimum dependence upon the conduction of heat through the metal.

The parts which receive the most heat during engine operation are the exhaust valve, exhaust port, combustion chamber and cylinder barrel.

In considering the cooling of the exhaust valve, it is obviously difficult to apply the second principle, since the valve is largely covered up by the valve seat, port, guide and spring, and even the air which might otherwise get through the valve spring to the upper end of the valve stem is cut off when an enclosed type of valve gear is used. Consequently, in this case it is necessary to depend on the transfer of heat to the cylinder through the valve seat and valve guide. The proper cooling of the exhaust valve is therefore largely a question of providing ample area for the transfer of heat to the valve seat and valve guide, and then providing for the best possible air cooling of these parts. This involves some very careful design, and is a problem on which a great deal of study and experimenting has been done. An article by Mr. S. D. Heron in the S. A. E. Journal for August, 1924, covers this subject very completely, and the reader is referred to this article for more complete information on the subject of exhaust valve cooling.

Proper cooling of the exhaust port depends primarily on its position with relation to the stream of cooling air. It is essential that the port be exposed directly to this air stream without interference from the intake port, manifolds, or exhaust pipes. The exhaust port must therefore be placed either directly in front, or at one side of the intake port, considering the "front" of the cylinder as the side against which the air stream is directed. It is usually desirable to face the port opening directly back. so that the exhaust pipe will not interfere with the free flow of cooling air to the port, valve seat and cylinder head. In a V-type engine, the cooling air is usually taken in through the front of the V and passed out between the cylinders. This necessitates placing the exhaust port in a position toward the inside of the V in order that cooling air may strike it as directly as possible. In this case, it is usually impossible to face the port away from the air stream, and in order to avoid interference with the air stream, the exhaust pipe is turned abruptly upward from the port opening and led out through the top of the cowling.

The combustion chamber walls of the cylinder require as much cooling as possible, especially over the valve seats, around the spark plug bosses, and at the points where the valve seats come nearest together. Without considering for the moment the question of finning the combustion chamber, a few remarks on its design may be helpful.

As mentioned before, a hemispherical or dome-shaped cylinder head brings the combustion chamber into such a position that a stream of air traveling in a direction at right angles to the cylinder axis impinges directly against the walls of the combustion chamber. The domed cylinder head shown in Figure 1 is therefore much to be preferred over the flat head shown in Figure 2. In order that the combustion chamber may receive the direct blast of cooling air on that portion surrounding the valve seats, it is necessary that the port elbows be raised well off the cylinder head so that the air can get underneath them and impinge on the metal adjacent to the valve seats. This is accomplished in a design such as that illustrated in Figure 3, while that of Figure 4 is a poor design in which no air space is allowed underneath the port elbow. In this latter case, a large portion of the valve seat must be cooled by the conduction of heat through the comparatively long space X shown in the figure.

The ports must be arranged with ample air space between them, so that the cooling air passes directly over the hot portion of the combustion chamber which is always present between the valve seats. Figure 1 shows how this should be accomplished, while Figure 2 shows a poor design allowing no air space between the ports. This latter design results in over-heated and warped valve seats and valves, if run under high duty conditions such as are encountered in aeronautical work.

It is generally advisable to place the spark plug bosses in such a position that the spark plugs are directly in the air stream. On the other hand, it is essential to keep the spark plugs on opposite sides of the combustion chamber and as far from the valves as possible, in which case one of the plugs is usually at the back of the cylinder where it is more or less shielded from the air blast. Modern aeronautical spark plugs, however, have been developed to a point where they will stand up under this unfavorable condition, so that it is permissible, where absolutely necessary, to locate one of the spark plug bosses out of the direct air stream.

It may be pointed out that where the air stream is directed at right angles to the cylinder axis, the side of the combustion chamber away from the air stream might be insufficiently cooled. Advocates of the axial fin cylinder, where the air is blown against the top of the cylinder head in a direction parallel to the cylinder axis, usually base their claims for the advantages of this design on the fact that the entire combustion chamber is subjected to the direct air blast. This would be true if it were not for the unavoidable interference from valve ports and intake and exhaust manifolds. Furthermore, the airplane installation of a design of this type would probably necessitate elaborate cowling and possibly blowers to give an adequate air blast against the cylinder heads. Experience has shown that by proper design of the combustion chamber, proper arrangement of the ports, and adequate cooling fins, the side of the combustion chamber away from the direct air blast does not become overheated.

(Continued on page 22)

Over Holland's Fairyland

(A Reminiscence by the Editor)

(Photo by Royal Dutch Air Forces)

The Hague is one of the most charming cities in northwestern Europe. In the foreground is the Vyver, a pretty sheet of water frequently enlivened by swans. Beyond it, the building with the two towers facing the square is the Hall of the Knights, used for joint sittings of the two Chambers and for the opening of the States General by the Queen. It was here that the second International Peace Conference was held in 1907. Other important buildings shown in the illustration are the Ministries of Foreign Affairs, Justice, and the Colonies. The building at the upper left corner of the Vyver is the Mauritshuis, containing a celebrated picture gallery.

SPEAKING of unique airplane jaunts, the story appearing in May issue of Slipstream by our western friend, Mr. Adams, coupled with the recent period of lovely spring weather and the presence of bright tulip beds, the editor of **Slipstream** is led to throw aside his blue pencil and recall pleasant memories surrounding a unique aerial trip over the Holland bulb fields **(Bolenlands)** in the vicinity of Leyden, The Hague and Haarlem.

A short time after the armistice was signed I found myself whisked too suddenly away from the "Apres la Guerre" celebrations in Paris to take up a rather unique sojourn in the land of Mijnheer Fokker—the land of "windmills and wooden shoes," and incidentally, of good airplanes. Here in a little cubby-hole at 64 Lange Voorhaut, two doors from the simple domain of the Queen Mother I spent eight months at the Military Attache, American Legation.

One bright afternoon in late April, our little exiled clan comprised of Colonel Davis, Major Ord, Captain Rose, the office girls and myself piled into the battered German Benz and went lumbering away over the cobbled streets to view the wonders of Amsterdam, the principal attraction, of course, being Rijks Museum—the rendezvous of most Americans in this quaint old city built on stilts.

It was during this visit, and a subsequent meeting of several Dutch pilots attached to the Fokker plant that I was invited to take an air jaunt over the country side. I have recalled the experience of this flight constantly because it was one of the most inspiring and enjoyable I have ever experienced although I developed a pretty "oily" complexion and ruined my only suit of precious "mufti," during the flight, in the unshielded front cockpit of the well-worn ship which was being used to train the entire Royal Dutch Air Forces at that time, so it seems.

The city of Amsterdam itself, like most Dutch cities is not at all striking or interesting from the air, the streets being narrow and the buildings so jumbled that from a moderate height the scene takes on the appearance of a conglomerate mass of smudge shadows. Once out into the farming districts and the "polders" a beautiful sight meets the eye. Spreading away for miles and miles from the rim of the Zuyder Zee, sprinkled with its toy fishing vessels, were the expanses of level lowland criss-crossed with canals of varied sizes. The larger of these canals bordered by uniform trees, white tow paths and bicycle "Wegs," made of tiny sea shells. The proverbial wind-mills were also much in evidence in certain areas and with their awkward paddles swinging around slowly in the breeze and all facing in the same direction they furnished a very good substitute for a wind "sleeve" in case we should have desired to land.

Approaching the neighborhood of Haarlem, a city every bit as crowded and smudgy as Amsterdam we ran into a veritable fairyland of flowers. As far as I could see a checker-board of crazy-quilt colors spread before us. Patch after patch of blossoms clothed the surface of the ground in vivid squares of white, blue, crimson and yellow hues. Each square was defined by its green bordered canal or ditch. The red tiled roofs of the farm houses surrounded by a clump of green trees and pasture lands dotted by white and black spotted cattle reminded one of a

ginger-bread painting. Along the white ribbons which marked the bicycle paths we could see hundreds and hundreds of bicycle riders, many of them bedecked with the bright blossoms and with happy couples pedaling along side by side and with arms entwined, as much at home as American lovers in an auto. From our height of some 2000 feet I imagined I could detect the fresh, pungent odors of the great field of tulips, lilies, hyacinths, crocuses and narcissus blossoms. We were soaring over a veritable world of flowers.

From the town of Leyden we followed the **"Stom Tram"** (Steam Tram) line to the capital city of The Hague. It looked for all the world like a toy railway and ever so often we noticed the little square engines pulling their miniature train of cars along the roadways and scooting over the hump of the canal bridges like the scenic trains of our amusement parks.

The Hague loomed before us with a far different aspect than the other Holland cities. From aloft it is quite easy for one to immediately discern the architectural schemes of a town's lay-out. There is nothing more beautiful and graphically illustrative of the artistry in the plans of such cities as Brussels, Paris, London and Berlin than to view them from aloft. The Hague has some semblance of such artistry here and there and its surroundings are so beautiful that we might well term it the Paris, the Venice, the Berlin of the Netherlands.

I remembered that history points out that The Hague was in early days a hunting park owned and operated by the Counts of Holland who used to come over frequently from Haarlem to hunt deer. From the air "the Count's inclosure", as the name signifies in Dutch is still half surrounded by a beautiful woodland criss-crossed by roadways and bridle paths and including a deer park and a Zoo. As we circled about the ancient and quaint old city I could not but conjure up those bits of stirring and lurid high-marks of history which were enacted there some 2000 feet below us and in the little village of Delft whose leaning church tower lifted above the lime trees to the southeastward where the great canal leads out toward the busy port of Rotterdam. Soaring in from over "Het Busch," or the city park, as called by the Hollanders, we circled directly above the ancient Viver, a pond of water in the center of the city that could tell many a tale of horror even to stake burnings on its cobbled shores. Bordering the pond stands the historical **Binnenholf** which has remained tenable since the year 1250 A. D. One of the archways leading from the enclosure of these buildings lead to the **Willem-splein** with is monument to the nation's George Washington, William of Orange, who was murdered there by the leaning church tower of Delft. From this old square the tram lines in a veritable net work twist and trail away to lose themselves in the dark narrow streets. Another arch from the **Binnenholf** leads to a smaller square near the old **Gevangenpoort** prison, and half hidden in the clump of trees hard by we see the roof of the stately but not pretentious building which housed the American Embassy. It, too, is a historical structure and was once the home of Holland's martyr—Cornelius De Witt—who with his brother were burned at the stake beneath the cluster of trees there by the peaceful and stagnant old Vyver. Around the corner from the Embassy stretched the wide Lange Voorhaut with its stately row of trees leading to the doorway of the Queen Mother's mansion, beside which I tried to pick out the spot where our little clan ferreted out so many secrets and dastardly tricks of the unscrupulous foreigner. The fine and spacious old hostelry, **Hotel des Indes,** was quite conspicuous, as was the Queen's Palace off to the west. The congested **Spuistraat,** looking more like a dark alley of an American city, teemed with myriads of ant-like objects of humanity. The **Hoogstraat** and the **Wegensstraat** held much the same aspect. Swinging away from the rough looking business centers we turn toward the northwest and toward the Peace Palace with its tall spires glistening in the bright sunlight. Near this spire-spiked edifice is the gateway leading into the thickly shaded "Old Way" leading toward the sea shore possibly a mile to the northwest and to the strange little fiisher village and sea resort of Schevengen. The native portion of the town is quite discernable from the more modern and pretentious section fronting the walled sea beach and with its broad brick promenade, its huge hotels, its sea-going pier terminated by the circular dancing pavilion surrounded by frothy white caps. Swooping down low over the broad stone-paved boulevard which almost invites a landing we sent scurrying for shelter many little groups of Schevengen fisher maids draped in their red-lined black capes and white caps. Sheltered in a little cove away from the open sea we could see scores of fishing vessels, and the bluish spirals of smoke lifting from the various buildings in the vicinity told where thousands of herring were being smoked to that mellow golden bronze-brown which only Holland fishermen can make, through centuries of experience. We noticed, too, a radio station and a light house near the sea wall that shelters the mouth of the cove. To the north and south the fantastic-shaped sand dunes stretched away along the sea furnishing the only "mountains" the Hollanders know. A great disposal canal empties into the sea at Schevengen and sends aloft an acrid odor which the open breeze from the ocean did not quite dispel.

After a last circle about Schevengen and the queer rounded building, which I afterwards learned as the headquarters for the Hagenbeck Circus we returned to The Hague following a course over the broad, more modern "New Way" bordering a large canal. We glimpsed the **Willem's Park** and the **Plein of 1913.** A lot of Dutch soldiers were practicing at horsemanship in a sand lot near this shaded beauty spot. At the **Schenkweg** we noticed the diminutive Steam Tram pulling out toward Leyden while further out of the city a more modern electric railway train slowly crawled along its elevated right-of-way.

With a last salute to the Queen presented with three graceful dips of the plane we wheeled off into the open **polders** again on our return to Amsterdam.

A few minutes ride, following the tree-crested dikes, straight as the shortest distance between two points and we were almost to our destination. Distances in Holland have no comparison with those in America. An airplane could no doubt traverse the whole of the Netherlands in a few hours. Haarlem, Leyden, Delft and numerous other smaller villages were within sight of The Hague from our altitude. Nearing Haarlem the sweeping outline of the Zuyder Zee could be plainly followed, and a dusky pall of smoky haze marked the site of Amsterdam.

Before I could realize it we were noseing down toward the sandy plot which marked our landing field. A great group of curious Hollanders ran forward to see the landing and only the skillful work of the pilot averted a catastrophe as several youngsters scurried from our path in their awkward **Klomps** or wooden shoes.

The amicable Dutch pilot insisted upon showering all of the thanks upon me for the enjoyable flight and after divers salutes from him, I turned my thoughts to the problem of finding a cake of soap and a bathhouse—both of which commodities seemed sadly lacking in this quaint land of flowers and cabbages.

FIRE HAZARD LESSENED

In the army air service, the alteration of the wartime DH4's into DH4B's, with fuel pumps and leakproof tanks replacing the old pressure feed system, has been very effective in reducing fire hazard when a crash occurs upon landing.

We will doubtless see commercial transport planes equipped with a parachute for each person on board, pump-fed leak-proof fuel tanks and fire protection systems increasing the present comparative safety of commercial air transportation to a point where the casualties can be considered in decimals only.

AN AERO SALESMAN

M. P. Miller, a recent graduate from Wallace Field Flying School, Davenport, Iowa, dropped into South Field, Dayton, Ohio, recently with his "Jenny" bedecked in bright letters, with the name of "Geo. D. Wanner & Company, manufacturers of E-Z Fly monoplane gliders," an advertising toy novelty.

Pilot Miller as the representative of this firm is traveling from city to city and has met with unusual success. From Dayton, Pilot Miller took off for Pontiac and Joliet, Illinois, where he has placed large orders for the E-Z Fly gliders.

Pilot Miller is an example of what can be done with a bit of enterprise and "pep." He has made his "Jenny" pay big dividends, through the above method.

MOSLER GETS "DOC" GRAHAM

The Mosler Metal Products Corp., manufacturers of aeronautical products, including the well known "spitfire" spark-plug and self-oiling timer announces that the company has recently acquired the services of M. D. (Doc) Graham, well known figure in automotive circles, who will be appointed Director of Sales. Mr. Graham's long experience and training as an engineer along with his knowledge of advertising, purchasing, production, etc., will fit him admirably to this new position.

SPECIAL ANNOUNCEMENT

The next and last installment of the Light Planes Series, by Ivan Driggs, which has been running regularly in Slipstream Monthly, will appear in the July issue with complete design drawings of a light plane using the data furnished in this series.

In this connection we wish also to announce that Slipstream Publishing Company has contracted with Mr. Driggs to furnish complete working drawings of his Light Airplane developed from data in this series. The price per set of the drawings is placed at $15.00. Remittance should be made direct to Slipstream Publishing Company, 401 Beckel Bldg., Dayton, Ohio.

Watch for the next installment in the July issue.

DETROIT PLANS ANOTHER HUGE AIRDROME

According to well founded announcements from Detroit, the Board of Commerce of this city is combining with the Detroit Aviation Society and the Detroit Air Board in an effort to establish a large airdrome. In this connection it is said the Common Council, which represents the city's legislative body, has ordered condemnation of a tract of 168 acres on the Detroit river opposite Belle Isle.

RS-1, LARGEST SEMI-RIGID AIRSHIP WON'T GO UP

The new Semi-Rigid Airship, RS-1, designed to be the largest of its kind ever built in this country is found to be structurally imperfect and could not be flown in recent tests at Scott Field, Bellville, Illinois.

The big bag is being deflated and the 713,000 cubic feet of helium gas being placed in containers for shipment to the Fort Worth helium plant for purification.

The RS-1 was constructed by the Goodyear Tire & Rubber Company, of Akron, Ohio. With a length of 285 feet it is practically a duplicate of the ill-fated Italian-built "Roma," which exploded in mid-air with a loss of 35 lives.

Just what faults are present in the RS-1 are not known. According to reports, the gas bag when inflated caused the envelope to contract in places and in such a manner that its lifting power is seriously impaired, so much so, in fact, that the ship will not ascend with the weight it is designed to carry.

Representatives from the Goodyear firm have returned to Akron from Scott Field pending revision in the plans which may mean a radical departure from the present design.

DETROIT U. STUDENTS BUILD LIGHT PLANE

Recent word coming from Professor C. H. Powell, head of the aeronautical department, University of Detroit, states that his light race plane is about ready for flight test. Professor Powell expected to have the plane ready for the Light plane race event held at Dayton last fall but failure of the English-made "Bristol Cherub" engine to arrive on time prevented the ship being entered.

The diminutive plane is designed primarily for racing purposes, with everything sacrificed for speed. Dimensions of the plane are: Wings 16 feet; length 11 feet; chord 28 inches; stagger 14 inches; dihedral 1½ degrees; weight, fully loaded 510 lbs.

The fuselage is of three-ply veneer. The aerofoil used is the familiar R. A. F. 15, increased.

The Bristol Cherub engine develops 25 horse power and will turn up to 2500 r. p. m., normally. The gas capacity is sufficient for a 300-mile flight. A Curtiss duralumin prop is used. The plane was built at a cost of about $1,600, a greater part of which amount was expended for the engine and transportation from England.

Edward W. Rentz, Peter Altman, Edward A. Sekerasky and E. S. Fitzgerald of the class of 1925 were Professor Powell's assistants in building the ship.

REPORT OF COLUMBUS (OHIO) AERO CLUB

IN this report it is desired to review briefly, Columbus aviation activities and to bring to the attention of the public the work the Aero Club of Columbus is doing in looking after interests in the general development of air navigation now taking place.

Like practically every other organization which has undertaken the task of serving its community in some one line of public endeavor, it is extremely hard for anyone not closely connected with the work to see the actual progress that is being made, and for this reason your attention is called to the following:—

A short four years ago Columbus was in no way identified with aviation. There was no landing field where an airplane might come to earth in safety. There was nothing being done to focus attention on Columbus as a possible unit in the national airways system. The city was doing nothing to exploit its many natural advantages as an aviation center. No encouragement was being held out to local aviation development and there was little, if any, public interest in the subject generally.

Today an entirely different picture is presented.

(1) Except for the big government experimental field at Dayton, **Columbus has the finest flying field in Ohio**—a field that has **all** the advantages desirable for its purpose.

(2) Columbus **is** closely identified with national aviation development because of the facilities it now provides for incoming air traffic, of which there is a surprising volume.

(3) Attention is now being focused on Columbus as the possible site for one of the few **big** airports to be established on the proposed great transcontinental air line.

(4) Through the Aero Club of Columbus everything possible is being done to broadcast this city's natural advantages as an air center, to the organizations, firms and individuals who are planning our future commercial airways.

(5) The Aero Club of Columbus is doing all in its power to stimulate and encourage local aviation activities and development.

(6) The Aero Club is keeping the local newspapers informed of interesting happenings in aviation and through these newspaper write-ups, local public interest is kept eager and alive.

This is the kind of work the Aero Club of Columbus is pledged to carry on—and **is** carrying on with the financial aid of its members. The money derived from its membership is spent to further the city's interest in the field of aviation and reviewing the club's achievements along this line, its members may well take pride in the accomplishments which they have made possible.

Another Air Unit For Columbus

There has recently been requested and authorized by the Militia Bureau, the establishment of a National Guard Air Field and Air Squadron for the state of Ohio. To have this new field and squadron allotted to Columbus is most desirable.

The Club is doing everything possible to secure this field for Columbus. Maps and complete data, pointing out the supreme fitness of Columbus for this new air organization have been gathered by the Aero Club and submitted to thte State Adjutant General's Department for study.

An Aero Club Headquarters

To carry on the work of the Aero Club it is urgent that a permanent headquarters be established. Plans for such a headquarters have been entertained for some time by the Club.

Plans are being instituted toward remodeling the two-story frame building on a plot of ground adjacent to Norton Field. At no great cost this structure can be made into a modern Club House where the organization can maintain its office and where members and their guests can gather to view the interesting flying maneuvers that take place. During the summer several Air Carnivals are scheduled to assist in raising the necessary funds for this work.

The Aero Club of Columbus is represented by the following board of Directors and officers:

Gen. Edward Orton, Jr., Fred C. Perkins, J. J. Munsell, Wm. M. Mumm, Wm. Mumm, Jr., John E. Davis, Wm. F. Centner, Howard M. Jones, George Bulford, Jr., and Maurice L. Mullay.

Sheffield, Ala.
May 11, 1925.

Slipstream Publishing Co.,
401 Beckel Bldg.,
Dayton, Ohio.

Dear Mr. Marshall:—

Please notify all the boys that the State of Tennessee, has passed a law which requires an aviator to pay twenty-five dollars for the county that a plane operates in, and at this rate it would cost a flyer $4750 a year to fly in every county in Tennessee, as there are ninety-five counties. This is a fine step to make when we are trying so hard to put Aviation before the Public. I know what I am talking about for I have a receipt for getting arrested and having to buy a License for just stopping for gas and hopping four passengers at Lawrenceburg, Tenn. The County Court Clerk says I will have to pay the same for every county I go to and carry and passengers. The Nashville Banner carried a Story on it and they say that I only have to pay one State Tax but the county can be duplicated and at that rate it would be $2400 a year so this is the co-operation we get in Tennessee.

(Signed) Roscoe Turner.

MORE HONORS FOR WRIGHT ENGINES

The Wright Aeronautical Corporation engine products are rapidly gaining spectacular laurels in all parts of the world.

The large quantities of the "Wright Whirlwind" motors being used by the U. S. Navy attest for the excellence of this type. Additional orders for this type are being filled for several foreign Governments. Peru and Argentina are using "Wright Whirlwind" engines for primary training planes, a large order for the latter Government now being in production. The Cuban Army is using the same motor for advanced training and for pursuit planes. Brazil has also ordered several of the type for primary training. An order is being negotiated with Canada for a large quantity of the "Whirlwinds" for use on various types of ships. The Royal Canadian Air Force recently concluded that this type of engine filled their requirements very satisfactorily from a performance and service standpoint. Their requirements are said to be difficult and specific and it was only after a very thorough investigation that this choice was made.

The U. S. Navy recently completed a 100-hour flying duration test on the "Wright Whirlwind" at the Naval Air Station, Anacosta. Mounted in a "T. R." ship the pilots were under instructions to fly it as much as possible. Several hours' flying time were put in every day that the weather permitted. After a 100-hour flying time test (117 hours actual running time) the engine was still found to be in A-1 condition and turning better at the end of the run than at the start.

This test certainly proves that the "Whirlwind" is as durable as the Wright E-4 was proven to be. This is quite a triumph for an air-cooled engine.

The "Wright Tornado" engine has driven in 12 world seaplane records which is double the number of records held by other engines of either American or European make.

(Continued from page 12)

crank shaft and connecting rods disassembled without unbolting the crank case from the engine bearers. Cast iron cylinders have intregal cooling fins, special attention having been paid to cooling the head and valve ports. Aluminum pistons together with forged duralumin connecting rods gives very light reciprocating parts. The counter balanced crankshaft has two throws at 180 deg. A simple spur gear train drives the camshaft and all accessories at the rear of the engine, the camshaft being mounted parallel to and above the crankshaft. The valves are operated by push rods and rocker arms, means being provided on the rocker arm for clearance adjustment. A gear type oil pump is incorporated in the timing gear cover and all accessories are mounted towards the rear on this cover which may be removed as an assembly.

The aluminum oil pump is attached to the crank case from below and is easily removed for inspection of all interior parts. About three quarts of oil is carried in the pump and an external indicator is provided to show the oil level at all times. A combination oil filler and breather is attached to the top of the crank case. A special aluminum 1.25" Stromberg carburetor is fitted to the rear of the engine as low as possible to enable a gravity fuel system to be used. Ignition is supplied by Scintilla magneto firing a single plug in each cylinder.

Flight tests on this engine will be carried out at an early date. It is planned to build a small number of these engines this year for use in light planes.

(Continued from page 11)

tion of the trans-continental air service. I will leave to take up my new duties largely because of the fact that I see in this new field an opportunity to render greater service."

The organization of the National Air Transport, Inc., brings together two of the pioneer aircraft companies of this country, the Curtiss Airplane and Motor Co., and the Wright Aeronautical Corp., together with the Aircraft Development Corp., of Detroit, where the first all-metal dirigible is in process of construction.

Business Back Confidence in Aviation With Money

The new airline is viewed by aviation experts and the public generally as evidence of the fact that transportation by air has arrived and that business men believe the airplane has been developed to the point of practicability.

In commenting on the purposes and plans of the National Air Transport, Mr Coffin said:

"Our story is a simple one. A group of men have associated themselves to do a much-needed job with their own money.

"The establishment of an over-night air express service between Chicago and New York is a practical engineering task. The success of the trans-continental air mail during the past nine months is sufficient demonstration of this. There are difficulties to be met, of course, but the application of radio for determining the direction and position of an airplane in flight, has removed much of the hazard which formerly prevailed. Dependable night air transportation without radio is as impossible as would be reliable train operation without the telegraph.

Air Line Will Begin Operation Early in Fall

"The National Air Transport hopes to begin operations early this autumn, confining its efforts at first to the transportation of express matter. After a definite and convincing physical demonstration of night operation has been made, it is likely, also, that bank clearings, securities and mail will be carried. It is not the present intention to give any consideration to the inauguration of passenger service.

"In spite of all that we read about the success of commercial air lines in Europe, the fact remains that not one is self supporting today. Air line deficits in Europe are met by direct Government subsidy. Such a plan is not looked upon in America as being economically sound. The National Air Transport is not founded on a Government subsidy plan. It is proceeding on the theory that the New York-Chicago route can, will and must pay its own way and that the cost of the service which it provides must be less than the advantage which the shipper derives because of the time saved. It proposes to meet an existing demand for faster transportation service between America's two largest industrial centers at a price that will render the enterprise profitable. Otherwise, the project would not be economically sound.

Congress Should Provide Aids to Aerial Navigation

"It is hoped that when Congress again convenes, its attention will be directed to the enactment of Federal legislation for the purpose of establishing traffic regulations governing the operation of aircraft and extending such assistance as it already provides for water navigation. The Federal Government safeguards water navigation on the seas, rivers, and Great Lakes with light-houses, channel-buoys, life-saving stations, meteorological reports, ocean charts, harbors and so forth. With the advent of this new and epoch-making means of transportation prompt steps should be taken by the Federal Government to safe-guard aerial navigation by the establishment of airports, emergency landing fields, beacon lights, weather reports and radio service. This is a public duty and cannot be ignored."

Dillon-Read, Rockefeller, Marshall Field and Others Back New Air Line

The officers of the company are: President, Howard E. Coffin, Hudson Motor Car Company, Detroit; Chairman Executive Committee, Clement E. Keys, Curtiss Aeroplane &Motor Company, New York; First vice-president, Charles L. Lawrence, Wright Aeronautical Corp., New York; Second vice-president, Wayne C. Taylor, Marshall Field, Glore, Ward & Co., Chicago; Third vice-president, Eugene W. Lewis, Industrial Bank, Detroit; Secretary, Carl B. Fritsche, Detroit; Treasurer, John J. Mitchell, Illinois Merchants Bank, Chicago; Counsel, Chester W. Cuthell, New York, and Wm. P. MacCracken, Chicago.

On the Executive Committee are: Clement M. Keys, New York, Chairman, and Leonard Kennedy, New York, Charles F. Glore, Chicago, Earl H. Reynolds, Wm. E. Metzger, Detroit, Harold H. Emmons, Detroit, C. T. Ludington. Philadelphia. The ex-officio members are: Howard E. Coffin and Carl B. Fritsche, of Detroit.

The directors are—for New York; Trowbridge Calloway, Calloway, Fish & Co.; Leonard Kennedy, Leonard Kennedy & Co.; C. M. Keys, Curtiss Aeroplane & Motor Co.; Charles L. Lawrence, Wright Aeronautical Co., Jeremiah Milbank, Allis-Chalmers Co.

For Chicago: Charles F. Glore, Marshall Field, Glore, Ward & Co.; Lester Armour, Armour & Co; Philip K. Wrigley, Wm. Wrigley, Jr. Corp.; Robert L. Lamont, American Steel Foundry Co.; Earl H. Reynolds, Peoples Trust and Savings Bank.

For Detroit: Howard E. Coffin, Hudson Motor Co.; Wm. E. Metzger; Walter L. Briggs, Briggs Mfg. Co.; Harold H. Emmons, Clark, Emmons, Bryant & Klein; George M. Holley, Holley Carburetor Co., and C. F. Kettering, President General Motors Research Corp.

Directors-at-Large: John Hays Hammond, Washington; W. J. Austin, Austin C., Cleveland; C. T. Ludington, Philadelphia; Wm. A. Rockefeller, Calloway, Fish & Co., New York.

Among the other incorporators are: Clarence Dillon, head of Dillon-Read & Co., New York bankers; Stuyvesant Fish; the Wrigley and Marshall Field interests and others whose names are known the world over.

FORD REVEALS COST OF AIR EXPRESS BETWEEN DETROIT AND CHICAGO

Complete figures on the cost of operating the Maiden Dearborn II during May in his air service between Detroit and Chicago have been made public by Henry Ford.

This plane made only nine round trips, flying 4,590 miles and carrying 18,077 pounds of freight at a cost of .1223 cents per pound. This figure of 12¼ cents a pound is higher than the 8½ cent rate figured on a partial basis at the first of June, when the Ford air service was only six weeks old.

The express rate between Detroit and Chicago is $2.05 a hundred pounds and the freight rate on metal parts, which is the biggest item the Ford planes carry, is 67 cents per hundred pounds. Truck costs adhere pretty closely to railroad freight rates. But the Ford plane makes a round trip in six hours. Delivery by any other means requires two days, at the very least.

The balance sheet on the Maiden Dearborn II shows the following: Depreciation of plane, $333.33; depreciation of motor, $315.58; insurance, $116.66.

Labor is figured at $733.02; gas and oil and repair parts cost $405.88 and miscellaneous expenses amounted to $48.29. The total costs were $1,752.53.

The nine round trips cost $1,947.75 each. The actual cost of putting a pound of freight in the air was .0969, or just under 10 cents, while the cost of handling it at both ends of the line was .0254. The total cost is .1223, or just a fraction less than 12¼ cents a pound.

(Continued from page 15)

The cooling of the cylinder barrel below the combustion chamber is largely a problem of proper cooling fin design. The remarks on fin design which

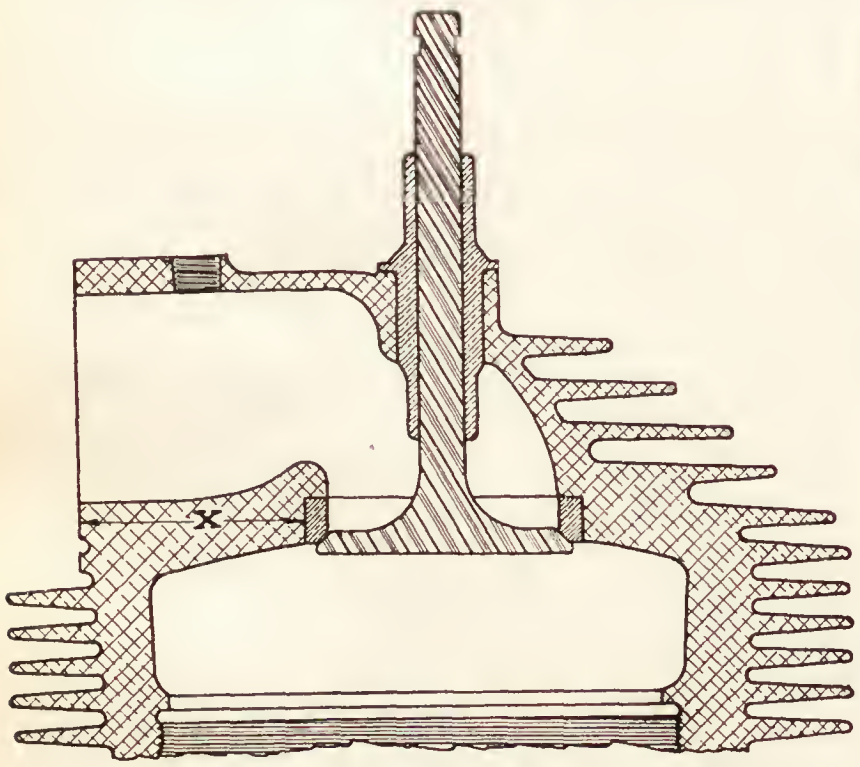


FIG. 4

follow are applicable, not only to the cylinder barrel, but to the combustion chamber walls and ports.

Table 1

Average power per cubic inch piston displacement for air-cooled aviation engine cylinder, 5.2 compression ratio.

R. P. M.	Brake Mean Effective Pressure Lb. per Sq. In.	Brake Horse Power Per Cubic Inch of Piston Displacement
1,600	123	.248
1,700	122	.261
1,800	121	.275
1,900	120	.287
2,000	119	.300
1,100	117	.310
2,200	115	.319

(To be continued)

Batavia,
November 27, 1924.

Messrs. Schnitzler & Co.,
Batavia, Java.

Dear Sirs:—

When the "Fokker VII" left Philippopel on its Holland to Java flight, we were afraid that the wings might have suffered from the weather conditions, and in addition would have to suffer more on the latter part of the voyage.

You must know that because of the lack of hangars (there was hardly one hangar during the whole flight that gave sufficient room to station the H.N.A.C.C.) we were compelled to leave the aeroplane in the open during the long stay in Philippopel. This resulted in the plane being every morning completely wet from the dew, whilst the last week in the Balkan States we experienced continuous and heavy rains.

Further, we had to pass sub-tropical and tropical regions, in which the plane had to sustain very great heat. During the seven weeks, the H.N.A.C.C. has been exposed to the most changing weather influences. On arrival at Batavia I found the wings were practically in the same condition as when leaving Amsterdam.

Without doubt this circumstance was greatly due to the fact that the wings were finished with VALSPAR Varnish.

Yours truly,
J. van der Hoop

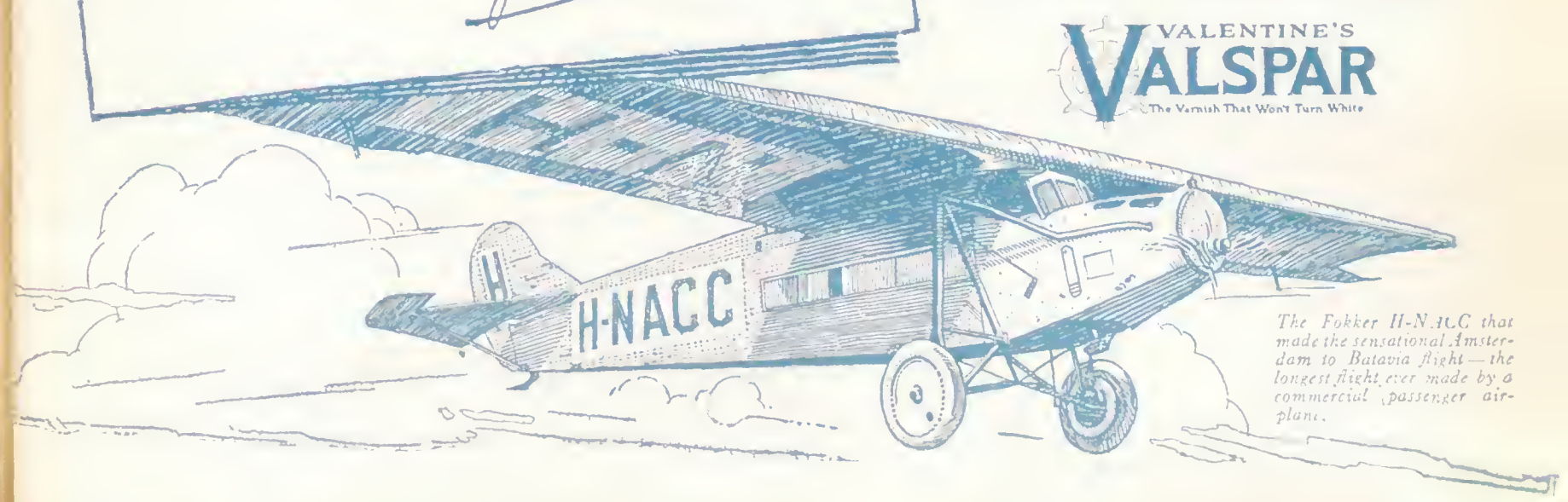
Across two continents —with Valspar!

FROM Amsterdam to Batavia in the Dutch East Indies—this is the record of the sturdy Fokker VII, piloted by the Dutch aviator Van der Hoop.

A long, gruelling test! For 9,820 miles this air liner was buffeted about through all kinds of weather—driving rain storms, scorching, blistering heat of the tropics! And when a forced landing in Bulgaria damaged the undercarriage, it stood in the open for weeks waiting for repairs, exposed to heavy night dews.

Yet at the end of its journey—wings, fuselage, and other varnished parts were as good as ever. *Valsparred, of course!* For like so many other leading airplane builders, the Fokker Company knows that no other varnish can equal Valspar in service and weatherproof protection.

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White



The Fokker H-NACC that made the sensational Amsterdam to Batavia flight—the longest flight ever made by a commercial passenger airplane.

SPEED WITH SAFETY

CURTISS CARRIER PIGEON

THE Air Mail Division of the United States Post Office Department is the greatest exponent of commercial aviation in the world. Having successfully proved over an operating period of eight months that a day and night schedule between New York and San Francisco was feasible and practical, the next step was to obtain aeroplanes that, with the same faithful Liberty motors and with the same or better performance, would double the pay load—thus doubling the income without materially increasing the operating costs. The Curtiss Aeroplane and Motor Company, Inc., were quick to see the opportunity and developed for the Air Mail Service, the Curtiss Carrier Pigeon.

On the official tests this machine made the following remarkable performance with full fuel load and a pay load of one-half a ton, twice that of the present DH.

High speed 128 MPH **Landing speed 50 MPH**
Cruising speed at 1500 RPM 108 MPH
Ceiling 16,200 ft.
Climb 1,000 ft. per minute to 3,000 ft.

The official cross-country flight of one hundred miles was made in fifty-nine and one-half minutes on twenty gallons of gasoline.

Five miles per gallon — Five cents per mile — Ten cents per ton mile.

This is Commercial Aviation with Real Economic Possibilities.

Curtiss Aeroplane & Motor Company, Inc.

Garden City, N. Y.